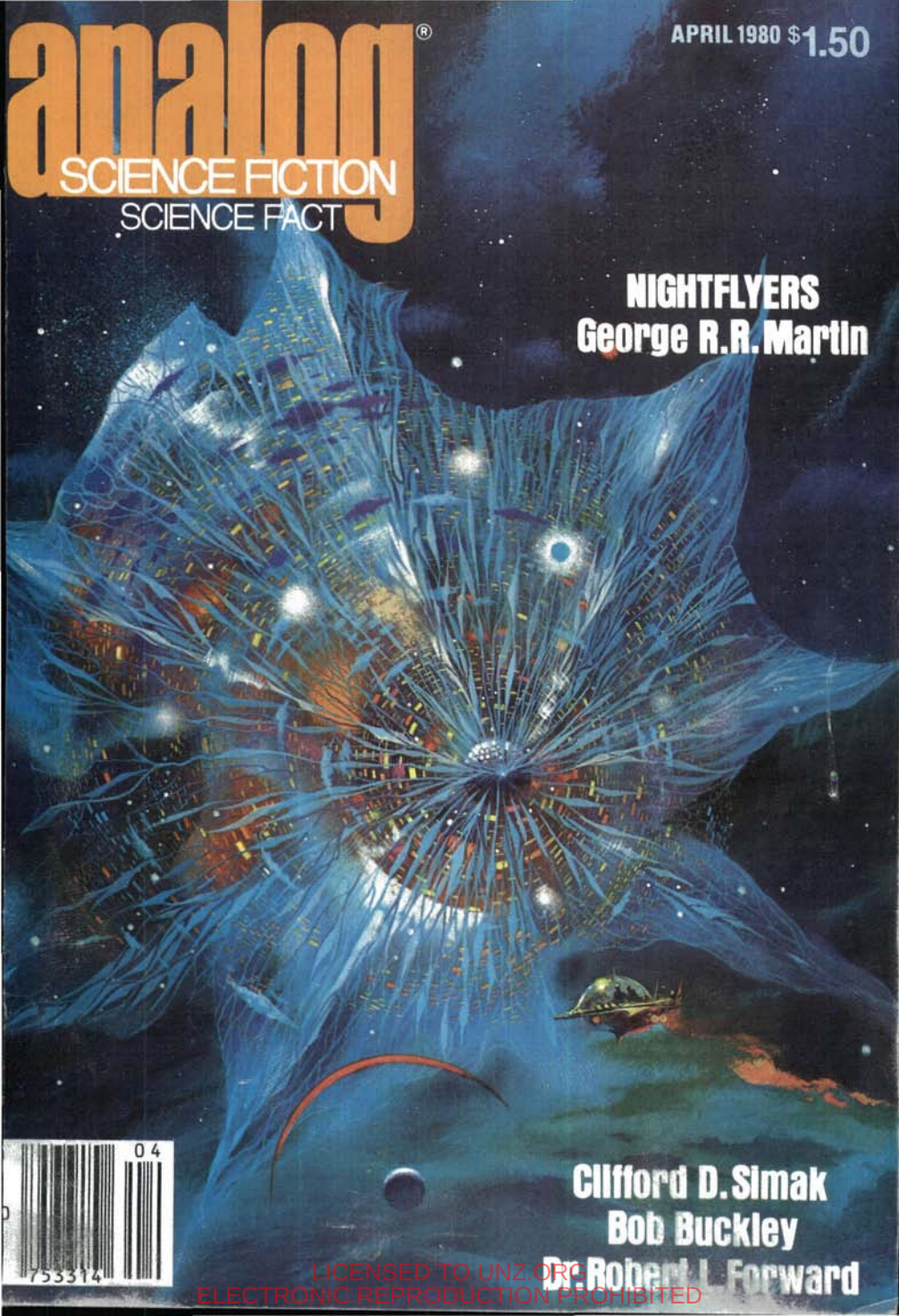

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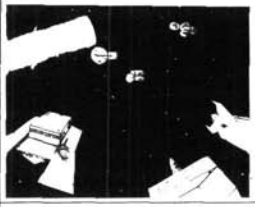

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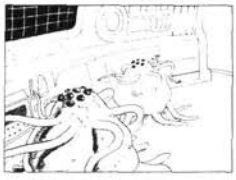

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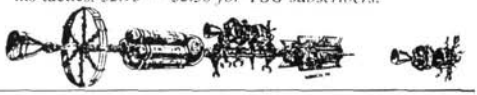

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ENERGY AND FREEDOM

by Stanley Schmidt

As I write this, some fifty Americans are still being held hostage in the United States embassy in Iran. Their captors demand the return of the deposed Shah; the U.S. government refuses to comply. Neither side has yet budged, but the United Nations Security Council is meeting in special sessions, importation of Iranian oil has been stopped, and Americans are bracing to withstand a resulting shortage. I would not venture to guess what the situation will be by the time you read this.

It is not my intention to comment on the actions of either side in either producing or dealing with this crisis. Even if I felt that it were appropriate for me to do so, a magazine with a four-month lead time is not the place to comment on current events *per se*. But I do want to pursue one quotation which has come out of the events to date, because its implications extend far beyond any particular political crisis.

In explaining his ban on Iranian oil imports and asking for a reduction in oil use, President Carter stated that the embassy takeover "makes it starkly clear to all of us that our excessive dependence on foreign oil is a direct physical threat to our freedom and security as Americans," and that the import ban would "remove any question that our principles might be compromised by our supposed need for Iranian oil."

Furthermore, the President said, "I am determined to make clear that we will never allow any foreign country to dictate any American policy. . . . Our love of freedom will not be auctioned off for foreign oil. Our freedom is not for sale—now or in the future."

All of which is fine—as far as it goes. But it's a peculiar sort of freedom that requires people to do *less* than they could without it.

What the Iranian crisis really demonstrates, at least as dramatically as any incident so far, is that if we want real freedom, we must produce our own energy. This is not the same as

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simply doing without that from outside sources. Freedom is indeed inextricably tied to energy, because anything you do requires energy. The less you have, the less you can do. The more someone else controls your supplies, the less you control what you can do. Depending on someone else for your energy most certainly is a limitation of freedom. *But so is a reduction of the available energy, for whatever reason.*

Elimination of dependence, in the sense of doing without energy from a particular source, is only a first step toward real independence. To avoid being merely a different kind of loss of freedom, in the long run, it must be followed promptly by a corresponding increase in efficiency of use (so that more can be done with less energy), or vigorous development of alternate, domestically controlled sources, or both. Certainly there is plenty of room for improvement in both areas, but neither has yet been given as high a priority as it deserves.

All too often, the last few years, we have found ourselves required to do less—heat less, drive less, etc.—because people did not see far enough ahead and plan for problems that were coming. We should not become too casual about accepting this as a routine thing. A good, well-managed technology enables people to do more, not less—and without having to justify every move as necessary or socially useful. Technologies which can do this are possible, and we should not willingly settle for less. Readers of this magazine are well acquainted with the role space can play, but many people are not—and we need to get the action under way *now,* because if we wait it may become much harder. Other steps toward a technology supporting real freedom can be found in both efficiency improvement and alternate energy sources, and we should be pursuing them just as vigorously. *All* of them—not just one or two selected as The Source(s) of the Future. If nothing else, the Iranian crisis should have made us very conscious of the dangers of putting all our ergs in one basket.

Furthermore, we should not get so caught up in the heat of an international confrontation that we forget that the dangers of dependence are not restricted to the international level. They provide, in fact, one of the most persuasive arguments I've heard against nuclear power—or, more precisely, excessive dependence on nuclear power in its present highly centralized form. Not because it's nuclear, but because it's centralized, with large numbers of people over a large area dependent on a single plant for a large part of their energy. The same argument holds against *any* highly centralized power system, whether fission, fusion, coal, gas, or solar power satellite. It doesn't mean we should quit using, building, or developing these—but it does suggest we should be wary of being any more dependent on them than we must.

Recently (while hurrying to catch a plane, naturally) I spent an hour and a

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quarter sitting on a dark, motionless train somewhere between stations in the Bronx. Reason? It was an electric train, and power was lost somewhere along the track we were using. Electric trains are nice, when they're running—but I hope that railroad keeps some diesel locomotives around, in case of a really prolonged or extensive power outage.

I did much of my growing up in a house with a coal furnace, later converted to gas. Coal was dirty and troublesome to use, and it didn't heat as comfortably as gas, but it did have one advantage. There was one supplier of gas, no way to stockpile, and if that supplier for any reason failed to deliver adequate gas—as it did in one recent winter—there was nowhere else to turn. Furthermore, in the absence of competition, prices were controlled only by governmental regulation. Coal, on the other hand, was sold by many competing dealers. If one set his prices too high, or ran out, a customer could look elsewhere. And he could lay in enough coal at the beginning of the winter to have a reasonable hope of getting through to the end even if new supplies became scarce (and if that happened he could decide for himself how to stretch what he had left). Supplies did become scarce at times, of course, even with coal—as in the long strike of a recent winter, when organized miners managed to threaten some cities' electricity supplies as effectively as OPEC countries have threatened petroleum supplies on some recent occasions.

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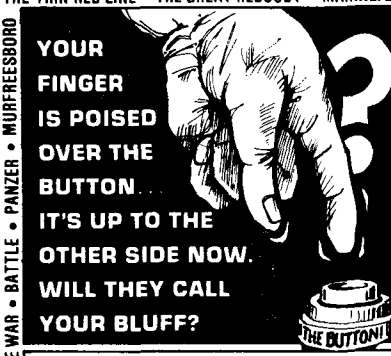

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Is nationalization—government control of energy production and distribution—a solution to such problems? Some think so; I'm highly skeptical. It's fine, I suppose, as long as the government in question remains forever competent and benevolent by everybody's standards. But how many

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governments have been able to truthfully make that claim, even briefly? Very few. And no matter how popular, well-meaning, and well-run a government may be *now*, history makes it abundantly clear that that can change fast—and not always for the better. The same can be said of any large organization, whether government, corporation, or labor union.

To that extent that any nation *or individual* depends on anyone else for energy, it or he or she is vulnerable and not free. For such reasons, ideally, I would like to have a private "energy well" in my backyard—and another in yours, and another in everybody else's. Each of these wells, ideally, would be big enough to supply any reasonable needs of its owner—and not too much bigger, because too much energy in any one set of hands is a potential threat to all others.

We are not likely to have such private energy wells, providing all or most of each individual's needs, in the foreseeable future—but it's interesting, and perhaps worthwhile, to speculate on what might happen if we did. Isaac Asimov has imagined such things, for example, in his story, "The Billiard Ball." There they arise as a serendipitous by-product of something else (antigravity), and near the end of the story the narrator tells us, "That was it. Everyone knows the consequences. Mankind had free energy and so we have the world we have now." That sentence suggests, and leaves open, a vast and fertile field of speculation. Given sources of free energy, available to all, what kind of world *would* we have? And, perhaps even more importantly, how would we get there from here?

How can it be worthwhile to think about something so unlikely to happen? First, while it seems most unlikely now, the probability is not absolutely and provably zero. We can't quite rule out the possibility that one of these years someone may stumble onto something that actually has the effect of Asimov's antigravity—though we'd be fools to count on it.

Second, something qualitatively similar but less drastic is much more likely to happen. There are systems now which can decentralize energy production to some extent—things like local (in-house, in-plant, on-farm) use of solar and wind power and biomass conversion, for example. It appears unlikely that these will be able to entirely replace the large-scale, centralized forms of energy, even after a concerted campaign to increase efficiencies so that we can do the things we want to with minimal waste. (Please note, incidentally, that by "waste" I do not mean your doing things that I consider unnecessary or vice versa. I mean only using more energy than necessary to do whatever each of us deems worth doing, for whatever reason.) Nor *should* small-scale systems replace large ones entirely. Large electric power plants, solar power satellites, moon rock used by Arnold-Kingsbury spaceports, and the like, make possible a wide range of eminently worthwhile activities which

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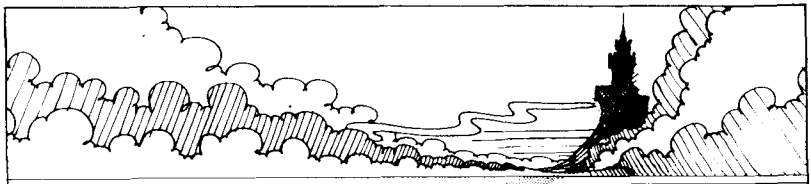

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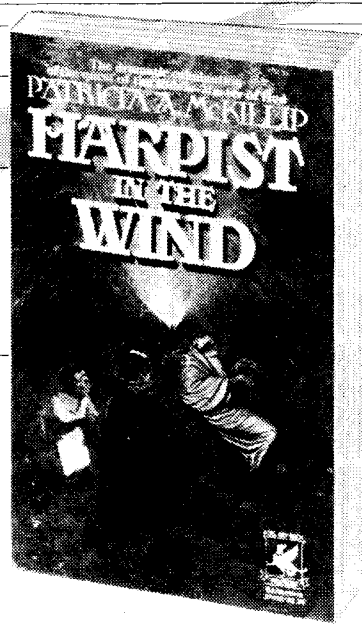

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probably cannot be done without them. Why not use the big systems to the extent necessary to do what only they can do—and meanwhile develop the best possible backyard systems to do what *they* can do? By a suitable division of the work load between large and small, we could retain and expand the benefits which only large systems can give, while reducing the risks and problems that come with them—and meanwhile give each of us a personal base of essential energy to sustain life even if our foreign suppliers or our own governments or utility companies fail us.

Sure, there are problems, mainly in getting from where we are to where we could be. Not the least of these is that the large suppliers are currently geared to providing a much larger share of their customers' energy than they might need to if decentralized systems were in widespread use. The sudden introduction of "free energy wells" in a haphazard way would terrifically disrupt the operation of these companies and, indirectly, the economy at large. Given the existing economic structure, it would be quite understandable if oil and gas and electric power companies fought tooth and nail to suppress such a device. In the short run, they could make a very good case that by doing so they were staving off a catastrophic economic collapse.

But in the *long* run, would they be right?

Or would they simply be substituting a slow decay for a fast collapse—when we could have, instead of either, a deliberate transition to a radically new system which, once established, would serve us much better for much longer?

That may well be the case—and the problems with "real" backyard systems differ from those of the "energy well" only in degree. It may be that we can imagine whole new systems which would indeed work better than the ones we're now using—but which are so different (meaning they involve changing so many variables at once) that we can't see how to get there from here.

But that's no excuse for not trying, and trying very hard. Transitions are virtually always painful, to some degree, for those caught in them. But the pain can sometimes be minimized by some advance thought and planning. Some of our most important problems now, in regard to energy and many other things, concern the art of change itself: how to figure out optimum systems, *and* how to make the transition to them from the status quo with as little disruption, damage, and other unpleasant side effects as possible.

In the particular case of energy, our recent experiences strongly suggest directions of change which governments, corporations, and individuals alike should strive to open up. We need a coordinated effort toward efficient use plus internalization, diversification, and decentralization of energy production, so that we will never again be this dependent on outside sources—*either* as a nation or as individuals. ■

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When Jesus of Nazareth hung dying on his cross, the *volcryn* passed within a light-year of his agony, headed outward. When the Fire Wars raged on Earth, the *volcryn* sailed near Old Poseidon, where the seas were still unnamed and unfished. By the time the stardrive had transformed the Federated Nations of Earth into the Federal Empire, the *volcryn* had moved into the fringes of Hrangan space. The Hrangans never knew it. Like us they were children of the small bright worlds that circled their scattered suns, with little interest and less knowledge of the things that moved in the gulfs between.

War flamed for a thousand years and the *volcryn* passed through it, unknowing and untouched, safe in a place where no fires could ever burn. Afterwards the Federal Empire was shattered and gone, and the Hrangans vanished in the dark of the Collapse, but it was no darker for the *volcryn*.

When Kleronomas took his survey ship out from Avalon, the *volcryn* came within ten light-years of him. Kleronomas found many things, but he did not find the *volcryn*. Not then did he and not on his return to Avalon a lifetime later.

When I was a child of three Kleronomas was dust, as distant and dead as Jesus of Nazareth and the *volcryn* passed close to Daronne. That season all the Crey sensitives grew strange and sat staring at the stars with luminous, flickering eyes.

When I was grown, the *volcryn* had sailed beyond Tara, past the range of even the Crey, still heading outward.

And now I am old and the *volcryn* will soon pierce the Tempter's Veil where it hangs like a black mist between the stars. And we follow, we follow. Through the dark gulfs where no one goes, through the emptiness, through the silence that goes on and on, my *Nightflyer* and I give chase.

From the hour the *Nightflyer* slipped into stardrive, Royd Eris watched his passengers.

Nine riders had boarded at the orbital docks above Avalon; five women and four men, each an Academy scholar, their backgrounds as diverse as their fields of study. Yet, to Royd, they dressed alike, looked alike, even sounded alike. On Avalon, most cosmopolitan of worlds, they had become as one in their quest for knowledge.

The *Nightflyer* was a trader, not a passenger vessel. It offered one double cabin, one closet-sized single. The other academicians rigged sleepwebs in the four great cargo holds, some in close confinement with the instruments and computer systems they had packed on board. When restive, they could wander two short corridors, one leading from the driveroom and the main airlock up past the cabins to a well-appointed lounge-library-kitchen, the other looping down to the cargo holds. Ultimately it did not matter where they wandered. Even in the sanitary stations, Royd had eyes and ears.

And always and everywhere, Royd watched.

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Concepts like a right of privacy did not concern him, but he knew they might concern his passengers, if they knew of his activities. He made certain that they did not.

Royd's own quarters, three spacious chambers forward of the passenger lounge, were sealed and inviolate; he never left them. To his riders, he was a disembodied voice over the communicators that sometimes called them for long conversations, and a holographic spectre that joined them for meals in the lounge. His ghost was a lithe, pale-eyed young man with white hair who dressed in filmy pastel clothing twenty years out of date, and it had the disconcerting habit of looking past the person Royd was addressing, or in the wrong direction altogether, but after a few days the academicians grew accustomed to it. The holograph walked only in the lounge, in any event.

But Royd, secretly, silently, lived everywhere, and ferreted out all of their little secrets.

The cyberneticist talked to her computers, and seemed to prefer their company to that of humans.

The xenobiologist was surly, argumentative, and a solitary drinker.

The two linguists, lovers in public, seldom had sex and snapped bitterly at each other in private.

The psipsych was a hypochondriac given to black depressions, which worsened in the close confines of the *Nightflyer.*

Royd watched them work, eat, sleep, copulate; he listened untiringly to their talk. Within a week, the nine of them no longer seemed the same to him at all. Each of them was strange and unique, he had concluded.

By the time the *Nightflyer* had been under drive for two weeks, two of the passengers had come to engage even more of his attention. He neglected none of them, watched all, but now, specially, he focused on Karoly d'Branin and Melantha Jhirl.

"Most of all, I want to know the *why* of them," Karoly d'Branin told him one false night the second week out from Avalon. Royd's luminescent ghost sat close to d'Branin in the darkened lounge, watching him drink bittersweet chocolate. The others were all asleep. Night and day are meaningless on a starship, but the *Nightflyer* kept the usual cycles, and most of the passengers followed them. Only Karoly d'Branin, administrator and generalist, kept his own solitary time.

"The *if* of them is important as well, Karoly," Royd replied, his soft voice coming from the communicator panels in the walls. "Can you be truly certain if these aliens of yours exist?"

"*I* can be certain," Karoly d'Branin replied. "That is enough. If everyone else were certain as well, we would have a fleet of research ships instead of your little *Nightflyer.*" He sipped at his chocolate, and gave a satisfied sigh. "Do you know the Nor T'alush, Royd?"

The name was strange to him, but it took Royd only a moment to con-

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sult his library computer. "An alien race on the other side of human space, past the Fyndii worlds and the Damoosh. Possibly legendary."

D'Branin chuckled. "Your library is out-of-date. You must supplement it the next time you are on Avalon. Not legends, no, real enough, though far away. We have little information about the Nor T'alush, but we are sure they exist, though you and I may never meet one. They were the start of it all.

"I was coding some information into the computers, a packet newly arrived from Dam Tullian after twenty standard years in transit. Part of it was Nor T'alush folklore. I had no idea how long that had taken to get to Dam Tullian, or by what route it had come, but it was fascinating material. Did you know that my first degree was in xenomythology?"

"I did not," Royd said. "Please continue."

"The *volcryn* story was among the Nor T'alush myths. It awed me; a race of sentients moving out from some mysterious origin in the core of the galaxy, sailing towards the galactic edge and, it was alleged, eventually bound for intergalactic space itself, meanwhile keeping always to the interstellar depths, no planetfalls, seldom coming within a light-year of a star. And doing it all *without a star-drive,* in ships moving only a fraction of the speed of light! That was the detail that obsessed me! Think how *old* they must be, those ships!"

"Old," Royd agreed. "Karoly, you said *ships.* More than one?"

"Oh, yes, there are," d'Branin said. "According to the Nor T'alush, one or two appeared first, on the innermost edges of their trading sphere, but others followed. Hundreds of them, each solitary, moving by itself, bound outward, always outward. The direction was always the same. For fifteen thousand standard years they moved between the Nor T'alush stars, and then they began to pass out from among them. The myth said that the last *volcryn* ship was gone three thousand years ago."

"Eighteen thousand years," Royd said, adding, "are your Nor T'alush that old?"

D'Branin smiled. "Not as star-travellers, no. According to their own histories, the Nor T'alush have only been civilized for about half that long. That stopped me for a while. It seemed to make the *volcryn* story clearly a legend. A wonderful legend, true, but nothing more.

"Ultimately, however, I could not let it alone. In my spare time, I investigated, cross-checking with other alien cosmologies to see whether this particular myth was shared by any races other than the Nor T'alush. I thought perhaps I would get a thesis out of it. It was a fruitful line of inquiry.

"I was startled by what I found. Nothing from the Hrangans, or the Hrangan slaveraces, but that made sense, you see. They were *out* from human space, the *volcryn* would not reach them until after they had passed through our own sphere. When I

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looked *in,* however, the *volcryn* story was everywhere. The Fyndii had it, the Damoosh appeared to accept it as literal truth—and the Damoosh, you know, are the oldest race we have ever encountered—and there was a remarkably similar story told among the gethsoids of Aath. I checked what little was known about the races said to flourish further in still, beyond even the Nor T'alush, and they had the *volcryn* story too."

"The legend of the legends," Royd suggested. The spectre's wide mouth turned up in a smile.

"Exactly, exactly," d'Branin agreed. "At that point, I called in the experts, specialists from the Institute for the Study of Nonhuman Intelligence. We researched for two years. It was all there, in the files and the libraries at the Academy. No one had ever looked before, or bothered to put it together.

"The *volcryn* have been moving through the manrealm for most of human history, since before the dawn of spaceflight. While we twist the fabric of space itself to cheat relativity, they have been sailing their great ships right through the heart of our alleged civilization, past our most populous worlds, at stately slow sublight speeds, bound for the Fringe and the dark between the galaxies. Marvelous, Royd, marvelous!"

"Marvelous," Royd agreed.

Karoly d'Branin set down his chocolate cup and leaned forward eagerly towards Royd's projection, but his hand passed through empty light when he tried to grasp his companion by the forearm. He seemed disconcerted for a moment, before he began to laugh at himself. "Ah, my *volcryn.* I grow overenthused, Royd. I am so close now. They have preyed on my mind for a dozen years, and within a month I will have them. Then, *then,* if only I can open communication, if only my people can reach them, then at last I will know the *why* of it!"

The ghost of Royd Eris, master of the *Nightflyer,* smiled for him and looked on through calm unseeing eyes.

Passengers soon grow restless on a starship under drive, sooner on one as small and spare as the *Nightflyer.* Late in the second week, the speculation began. Royd heard it all.

"Who is this Royd Eris, really?" the xenobiologist complained one night when four of them were playing cards. "Why doesn't he come out? What's the purpose of keeping himself sealed off from the rest of us?"

"Ask him," the linguist suggested.

No one did.

When he was not talking to Karoly d'Branin, Royd watched Melantha Jhirl. She was good to watch. Young, healthy, active, Melantha Jhirl had a vibrancy about her that the others could not touch. She was big in every way; a head taller than anyone else on board, large-framed, large-breasted, long-legged, strong, muscles moving fluidly beneath shiny coal-black skin. Her appetites were big as well. She ate twice as much as any of her col-

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leagues, drank heavily without ever seeming drunk, exercised for hours every day on equipment she had brought with her and set up in one of the cargo holds. By the third week out she had sexed with all four of the men on board and two of the other women. Even in bed she was always active, exhausting most of her partners. Royd watched her with consuming interest.

"I am an improved model," she told him once as she worked out on her parallel bars, sweat glistening on her bare skin, her long black hair confined in a net.

"Improved?" Royd said. He could not send his holographic ghost down to the holds, but Melantha had summoned him with the communicator to talk while she exercised, not knowing he would have been there anyway.

She paused in her routine, holding her body aloft with the strength of her arms. "Altered, Captain," she said. She had taken to calling him that. "Born on Prometheus among the elite, child of two genetic wizards. Improved, Captain. I require twice the energy you do, but I use it all. A more efficient metabolism, a stronger and more durable body, an expected lifespan half again the normal human's. My people have made some terrible mistakes when they try to radically redesign the lessers, but the small improvements they do well."

She resumed her exercises, moving quickly and easily, silent until she had finished. Then, breathing heavily, she crossed her arms and cocked her head and grinned. "Now you know my life story, Captain, unless you care to hear the part about my defection to Avalon, my extraordinary work in nonhuman anthropology, and my tumultuous and passionate lovelife. Do you?"

"Perhaps some other time," Royd said, politely.

"Good," Melantha Jhirl replied. She snatched up a towel and began to dry the sweat from her body. "I'd rather hear your life story, anyway. Among my modest attributes is an insatiable curiosity. Who are you, Captain? Really?"

"One as improved as you," Royd replied, "should certainly be able to guess."

Melantha laughed, and tossed her towel at the communicator grill.

By that time all of them were guessing, when they did not think Royd was listening. He enjoyed the rumors.

"He talks to us, but he can't be seen," the cyberneticist said. "This ship is uncrewed, seemingly all automated except for him. Why not entirely automated, then? I'd wager Royd Eris is a fairly sophisticated computer system, perhaps an Artificial Intelligence. Even a modest program can carry on a blind conversation indistinguishable from a human's."

The telepath was a frail young thing, nervous, sensitive, with limp flaxen hair and watery blue eyes. He sought out Karoly d'Branin in his cabin, the cramped single, for a private conversation. "I feel it," he said

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excitedly. "Something is wrong, Karoly, something is very wrong. I'm beginning to get frightened."

D'Branin was startled. "Frightened? I don't understand, my friend. What is there for you to fear?"

The young man shook his head. "I don't know, I don't know. Yet it's there, I feel it. Karoly, I'm picking up something. You know I'm good, I am, that's why you picked me. Class one, tested, and I tell you I'm afraid. I sense it. Something dangerous. Something volatile—and alien."

"My *volcryn*?" d'Branin said.

"No, no, impossible. We're in drive, they're light-years away." The telepath's laugh was desperate. "I'm not *that* good, Karoly. I've heard your Crey story, but I'm only a human. No, this is close. On the ship."

"One of us?"

"Maybe," the telepath said. "I can't sort it out."

D'Branin sighed and put a fatherly hand on the young man's shoulder. "I thank you for coming to me, but I cannot act unless you have something more definite. This feeling of yours—could it be that you are just tired? We have all of us been under strain. Inactivity can be taxing."

"This is real," the telepath insisted, but he left peacefully.

Afterwards d'Branin went to the psipsych, who was lying in her sleepweb surrounded by medicines, complaining bitterly of aches. "Interesting," she said when d'Branin told her. "I've felt something too, a sense of threat, very vague, diffuse. I thought it was me, the confinement, the boredom, the way I feel. My moods betray me at times. Did he say anything more specific?"

"No."

"I'll make an effort to move around, read him, read the others, see what I can pick up. Although, if this is real, he should know it first. He's a one, I'm only a three."

D'Branin nodded, reassured. Later, when the rest had gone to sleep, he made some chocolate and talked to Royd through the false night. But he never mentioned the telepath once.

"Have you noticed the clothes on that holograph he sends us?" the xenobiologist said to the others. "A decade out of style, at least. I don't think he really looks like that. What if he's deformed, sick, ashamed to be seen the way he really looks? Perhaps he has some disease. The Slow Plague can waste a person terribly, but it takes decades to kill, and there are other contagions, manthrax and new leprosy and Langamen's Disease. Could it be that Royd's self-imposed quarantine is just that. A quarantine. Think about it."

In the fifth week out, Melantha Jhirl pushed her pawn to the sixth rank and Royd saw it was unstoppable and resigned. It was his eighth straight defeat at her hands in as many days. She was sitting cross-legged on the floor of the lounge, the chessmen spread out before her on a viewscreen, its receiver dark. Laughing, she swept

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them away. "Don't feel bad, Royd," she told him. "I'm an improved model. Always three moves ahead."

"I should tie in my computer," he replied. "You'd never know." His holographic ghost materialized suddenly, standing in front of the viewscreen, and smiled at her.

"I'd know within three moves," Melantha Jhirl said. "Try it." She stood up and walked right through his projection on her way to the kitchen, where she found herself a bulb of beer. "When are you going to break down and let me behind your wall for a visit, Captain?" she asked, talking up to a communicator grill. She refused to treat his ghost as real. "Don't you get lonely there? Sexually frustrated? Claustrophobic?"

"I've flown the *Nightflyer* all my life, Melantha," Royd said. His projection ignored, winked out. "If I were subject to claustrophobia, sexual frustration, or loneliness, such a life would have been impossible. Surely that should be obvious to you, being as improved a model as you are?"

She took a squeeze of her beer and laughed her mellow, musical laugh at him. "I'll solve you yet, Captain," she warned.

"Fine," he said. "Meanwhile, tell me some more lies about your life."

"Have you ever heard of Jupiter?" the xenotech demanded of the others. She was drunk, lolling in her sleepweb in the cargo hold.

"Something to do with Earth," one of the linguists said. "The same myth system originated both names, I believe."

"Jupiter," the xenotech announced loudly, "is a gas giant in the same solar system as Old Earth. Didn't know that, did you? They were on the verge of exploring it when the stardrive was discovered, oh, way back. After that, nobody bothered with gas giants. Just slip into drive and find the habitable worlds, settle them, ignore the comets and the rocks and the gas giants—there's another star just a few light-years away, and it has more habitable planets. But there were people who thought those Jupiters might have life, you know. Do you see?"

The xenobiologist looked annoyed. "If there is intelligent life on the gas giants, it shows no interest in leaving them," he snapped. "All of the sentient species we have met up to now have originated on worlds similar to Earth, and most of them are oxygen breathers. Unless you suggest that the *volcryn* are from a gas giant?"

The xenotech pushed herself up to a sitting position and smiled conspiratorially. "Not the *volcryn*," she said. "Royd Eris. Crack that forward bulkhead in the lounge, and watch the methane and ammonia come smoking out." Her hand made a sensuous waving motion through the air, and she convulsed with giddy laughter.

"I dampened him," the psipsych reported to Karoly d'Branin during the sixth week. "Psionine-4. It will blunt his receptivity for several days, and I have more if he needs it."

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D'Branin wore a stricken look. "We talked several times, he and I. I could see that he was becoming ever more fearful, but he could never tell me the why of it. Did you absolutely have to shut him off?"

The psipsych shrugged. "He was edging into the irrational. You should never have taken a class one telepath, d'Branin. Too unstable."

"We must communicate with an alien race. I remind you that is no easy task. The *volcryn* are perhaps more alien than any sentients we have yet encountered. Because of that we needed class one skills."

"Glib," she said, "but you might have no working skills at all, given the condition of your class one. Half the time he's catatonic and half the time crazy with fear. He insists that we're all in real physical danger, but he doesn't know why or from what. The worst of it is I can't tell if he's really sensing something or simply having an acute attack of paranoia. He certainly displays some classic paranoid symptoms. Among other things, he believes he's being watched. Perhaps his condition is completely unrelated to us, the *volcryn*, and his talent. I can't be sure at this point in time."

"What of your own talent?" d'Branin said. "You are an empath, are you not?"

"Don't tell me my job," she said sharply. "I sexed with him last week. You don't get more proximity or better rapport for esping than that. Even under those conditions, I couldn't be sure of anything. His mind is a chaos, and his fear is so rank it stank up the sheets. I don't read anything from the others either, besides the ordinary tensions and frustrations. But I'm only a three, so that doesn't mean much. My abilities are limited. You know I haven't been feeling well, d'Branin. I can barely breathe on this ship. My head throbs. Ought to stay in bed."

"Yes, of course," d'Branin said hastily. "I did not mean to criticize. You have been doing all you can under difficult circumstances. Yet, I must ask, is it vital he be dampened? Is there no other way? Royd will take us out of drive soon, and we will make contact with the *volcryn*. We will need him."

The psipsych rubbed her temple wearily, "My other option was an injection of esperon. It would have opened him up completely, tripled his psionic receptivity for a few hours. Then, hopefully, he could home in this danger he's feeling. Exorcise it if it's false, deal with it if it's real. But psionine-4 is a lot safer. The physical side effects of esperon are debilitating, and emotionally I don't think he's stable enough to deal with that kind of power. The psionine should tell us something. If his paranoia continues to persist, I'll know it has nothing to do with his telepathy."

"And if it does not persist?" Karoly d'Branin said.

She smiled wickedly. "Then we'll know that he really was picking up some sort of threat, won't we?"

False night came, and Royd's wraith materialized while Karoly d'Branin sat

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brooding over his chocolate. "Karoly," the apparition said, "would it be possible to tie in the computer your team brought on board with my shipboard system? Those *volcryn* stories fascinate me, and I'd like to be able to study them at my leisure."

"Certainly," d'Branin replied in an offhand, distracted manner. "It is time we got our system up and running in any case. Soon, now, we will be dropping out of drive."

"Soon, " Royd agreed. "Approximately seventy hours from now."

At dinner the following day, Royd's projection did not appear. The academicians ate uneasily, expecting their host to materialize at any moment, take his accustomed place, and join in the mealtime conversation. Their expectations were still unfulfilled when the afterdinner pots of chocolate and spiced tea and coffee were set on the table before them.

"Our captain seems to be occupied," Melantha Jhirl observed, leaning back in her chair and swirling a snifter of brandy.

"We will be shifting out of drive soon," Karoly d'Branin said. "There are preparations to make."

Some of the others looked at one another. All nine of them were present, although the young telepath seemed lost in his own head. The xenobiologist broke the silence. "He doesn't eat. He's a damned holograph. What does it matter if he misses a meal? Maybe it's just as well. Karoly, a lot of us have been getting uneasy about Royd. What do you know about this mystery man anyway?"

D'Branin looked at him with wide, puzzled eyes. "Know, my friend?" he said, leaning forward to refill his cup with the thick, bittersweet chocolate. "What is there to know?"

"Surely you've noticed that he never comes out to play with us," the female linguist said drily. "Before you engaged his ship, did anyone remark on this quirk of his?"

"I'd like to know the answer to that too," her partner said. "A lot of traffic comes and goes through Avalon. How did you come to choose Eris? What were you told about him?"

D'Branin hesitated. "Told about him? Very little, I must admit. I spoke to a few port officials and charter companies, but none of them were acquainted with Royd. He had not traded out of Avalon originally, you see."

"Where *is* he from?" the linguists demanded in unison. They looked at each other, and the woman continued. "We've listened to him. He has no discernible accent, no idiosyncrasies of speech to betray his origins. Tell us, where did this *Nightflyer* come from?"

"I—I don't know, actually," d'Branin admitted, hesitating. "I never thought to ask him about it."

The members of his research team glanced at each other incredulously. "You never thought to *ask*?" the xenotech said. "How did you select this ship, then?"

"It was available. The administrative council approved my project and assigned me personnel, but they

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could not spare an Academy ship. There were budgetary constraints as well." All eyes were on him.

"What d'Branin is saying," the psipsych interrupted, "is that the Academy was pleased with his studies in xenomyth, with the discovery of the *volcryn* legend, but less than enthusiastic about his plan to prove the *volcryn* real. So they gave him a small budget to keep him happy and productive, assuming that this little mission would be fruitless, and they assigned him workers who wouldn't be missed back on Avalon." She looked around at each person. "Except for d'Branin," she said, "not a one of us is a first-rate scholar."

"Well, you can speak for yourself," Melantha Jhirl said. "I volunteered for this mission."

"I won't argue the point," the psipsych said. "The crux is that the choice of the *Nightflyer* is no large enigma. You engaged the cheapest charter you could find, didn't you, d'Branin?"

"Some of the available ships would not even consider my proposition," d'Branin said. "The sound of it is odd, we must admit. And many ship masters seemed to have a superstitious fear of dropping out of drive in interstellar space, without a planet near. Of those who agreed to the conditions, Royd Eris offered the best terms, and he was able to leave at once."

"And we *had* to leave at once," said the female linguist. "Otherwise the *volcryn* might get away. They've only been passing through this region for ten thousand years, give or take a few thousand," she said sarcastically.

Someone laughed. D'Branin was nonplussed. "Friends, no doubt I could have postponed departure. I admit I was eager to meet my *volcryn,* to ask them the questions that have haunted me, to discover the why of them, but I must also admit that a delay would have been no great hardship. But *why*? Royd is a gracious host, a skilled pilot, he has treated us well."

"He has made himself a cipher," someone said.

"What is he hiding?" another voice demanded.

Melantha Jhirl laughed. When all eyes had moved to her, she grinned and shook her head. "Captain Royd is perfect, a strange man for a strange mission. Don't any of you love a mystery? Here we are flying light-years to intercept a hypothetical alien starship from the core of the galaxy that has been outward bound for longer than humanity has been having wars, and all of you are upset because you can't count the warts of Royd's nose." She leaned across the table to refill her brandy snifter. "My mother was right," she said lightly. "Normals are subnormal."

"Melantha is correct," Karoly d'Branin said quietly. "Royd's foibles and neuroses are his business, if he does not impose them on us."

"It makes me uncomfortable," someone complained weakly.

"For all we know, Karoly," said the xenotech, "we might be travelling with a criminal or an alien."

"*Jupiter*," someone muttered. The

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xenotech flushed red, and there was sniggering around the long table.

But the young, pale-haired telepath looked up suddenly and stared at them all with wild, nervous eyes. "An *alien*," he said.

The psipsych swore. "The drug is wearing off," she said quickly to d'Branin. "I'll have to go back to my room to get some more."

All of the others looked baffled; d'Branin had kept his telepath's condition a careful secret. "What drug?" the xenotech demanded. "What's going on here?"

"Danger," the telepath muttered. He turned to the cyberneticist sitting next to him, and grasped her forearm in a trembling hand. "We're in danger, I tell you, I'm reading it. Something *alien*. And it means us ill."

The psipsych rose. "He's not well," she announced to the others. "I've been dampening him with psionine, trying to hold his delusions in check. I'll get some more." She started towards the door.

"Wait," Melantha Jhirl said. "Not psionine. Try esperon."

"Don't tell me my job, woman."

"Sorry," Melantha said. She gave a modest shrug. "I'm one step ahead of you, though. Esperon might exorcise his delusions, no?"

"Yes, but—"

"And it might let him focus on this threat he claims to detect, correct?"

"I know the characteristics of esperon," the psipsych said testily.

Melantha smiled over the rim of her brandy glass. "I'm sure you do," she said. "Now listen to me. All of you are anxious about Royd, it seems. You can't stand not knowing what he's concealing about himself. You suspect him of being a criminal. Fears like that won't help us work together as a team. Let's end them. Easy enough." She pointed. "Here sits a class one telepath. Boost his power with esperon and he'll be able to recite our captain's life history to us, until we're all suitably bored with it. Meanwhile he'll also be vanquishing his personal demons."

"*He's watching us*," the telepath said in a low, urgent voice.

"Karoly," the xenobiologist said, "this has gone too far. Several of us are nervous, and this boy is terrified. I think we all need an end to the mystery of Royd Eris. Melantha is right."

D'Branin was troubled. "We have no right—"

"We have the *need*," the cyberneticist said.

D'Branin's eyes met those of the psipsych, and he sighed. "Do it," he said. "Get him the esperon."

"*He's going to kill me*," the telepath screamed and leapt to his feet. When the cyberneticist tried to calm him with a hand on his arm, he seized a cup of coffee and threw it square in her face. It took three of them to hold him down. "Hurry," one commanded, as the youth struggled.

The psipsych shuddered and quickly left the lounge.

Royd was watching.

When the psipsych returned, they

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lifted the telepath to the table and forced him down, pulling aside his hair to bare the arteries in his neck.

Royd's ghost materialized in its empty chair at the foot of the long dinner table. "Stop that," it said calmly. "There is no need."

The psipsych froze in the act of slipping an ampule of esperon into her injection gun, and the xenotech startled visibly and released one of the telepath's arms. But the captive did not pull free. He lay on the table, breathing heavily, too frightened to move, his pale blue eyes fixed glassily on Royd's projection.

Melantha Jhirl lifted her brandy glass in salute. "Boo," she said. "You've missed dinner, Captain."

"Royd," said Karoly d'Branin, "I am sorry."

The ghost stared unseeing at the far wall. "Release him," said the voice from the communicators. "I will tell you my great secret, if my privacy intimidates you so."

"He *has* been watching us," the male linguist said.

"Tell, then," the xenotech said suspiciously. "What are you?"

"I liked your guess about the gas giants," Royd said. "Sadly, the truth is less dramatic. I am an ordinary *Homo sapien* in late middle-age. Sixty-eight standard, if you require precision. The holograph you see before you was the real Royd Eris, although some years ago. I am older now."

"Oh?" The cyberneticist's face was red where the coffee had scalded her. "Then why the secrecy?"

"I will begin with my mother," Royd replied. "The *Nightflyer* was her ship originally, custom-built to her design in the Newholme spaceyards. My mother was a freetrader, a notably successful one. She made a fortune through a willingness to accept the unusual consignment, fly off the major trade routes, take her cargo a month or a year or two years beyond where it was customarily transferred. Such practices are riskier but more profitable than flying the mail runs. My mother did not worry about how often she and her crews returned home. Her ships were her home. She seldom visited the same world twice if she could avoid it."

"Adventurous," Melantha said.

"No," said Royd. "Sociopathic. My mother did not like people, you see. Not at all. Her one great dream was to free herself from the necessity of crew. When she grew rich enough, she had it done. The *Nightflyer* was the result. After she boarded it at Newholme, she never touched a human being again, or walked a planet's surface. She did all her business from the compartments that are now mine. She was insane, but she did have an interesting life, even after that. The worlds she saw, Karoly! The things she might have told you! Your heart would break. She destroyed most of her records, however, for fear that other people might get some use or pleasure from her experience after her death. She was like that."

"And you?" the xenotech said.

"I should not call her my mother," Royd continued. "I am her cross-sex clone. After thirty years of flying this

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ship alone, she was bored. I was to be her companion and lover. She could shape me to be a perfect diversion. She had no patience with children, however, and no desire to raise me herself. As an embryo, I was placed in a nurturant tank. The computer was my teacher. I was to be released when I had attained the age of puberty, at which time she guessed I would be fit company.

"Her death, a few months after the cloning, ruined the plan. She had programmed the ship for such an eventuality, however. It dropped out of drive and shut down, drifted in interstellar space for eleven years while the computer made a human being out of me. That was how I inherited the *Nightflyer*. When I was freed, it took me some years to puzzle out the operation of the ship and my own origins."

"Fascinating," said d'Branin.

"Yes," said the female linguist, "but it doesn't explain why you keep yourself in isolation."

"Ah, but it does," Melantha Jhirl said. "Captain, perhaps you should explain further for the less improved models?"

"My mother hated planets," Royd said. "She hated stinks and dirt and bacteria, the irregularity of the weather, the sight of other people. She engineered for us a flawless environment, as sterile as she could possibly make it. She disliked gravity as well. She was accustomed to weightlessness, and preferred it. These were the conditions under which I was born and raised.

"My body has no natural immunities to anything. Contact with any of you would probably kill me, and would certainly make me very sick. My muscles are feeble, atrophied. The gravity the *Nightflyer* is now generating is for your comfort, not mine. To me it is agony. At the moment I am seated in a floating chair that supports my weight. I still hurt, and my internal organs may be suffering damage. It is one reason why I do not often take on passengers."

"You share your mother's opinion of the run of humanity, then?" the psipsych said.

"I do not. I like people. I accept what I am, but I did not choose it. I experience human life in the only way I can, vicariously, through the infrequent passengers I dare to carry. At those times, I drink in as much of their lives as I can."

"If you kept your ship under weightlessness at all times, you could take on more riders, could you not?" suggested the xenobiologist.

"True," Royd said politely. "I have found, however, that most people choose not to travel with a captain who does not use his gravity grid. Prolonged free-fall makes them ill and uncomfortable. I could also mingle with my guests, I know, if I kept to my chair and wore a sealed environment suit. I have done so. I find it lessens my participation instead of increasing it. I become a freak, a maimed thing, one who must be treated differently and kept at a distance. I prefer isolation. As often as I dare, I study the

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aliens I take on as riders."

"Aliens?" the xenotech said, in a confused voice.

"You are all aliens to me," Royd answered.

Silence then filled the *Nightflyer's* lounge.

"I am sorry this had to happen, my friend," Karoly d'Branin said to the ghost.

"Sorry," the psipsych said. She frowned and pushed the ampule of esperon into the injection chamber. "Well, it's glib enough, but is it the truth? We still have no proof, just a new bedtime story. The holograph could have claimed it was a creature from Jupiter, a computer, or a diseased war criminal just as easily." She took two quick steps forward to where the young telepath still lay on the table. "He still needs treatment, and we still need confirmation. I don't care to live with all this anxiety, when we can end it all now." Her hand pushed the unresisting head to one side, she found the artery, and pressed the gun to it.

"No," the voice from the communicator said sternly. "Stop. I order it. This is my ship. Stop."

The gun hissed loudly, and there was a red mark when she lifted it from the telepath's neck.

He raised himself to a half-sitting position, supported by his elbows, and the psipsych moved close to him. "Now," she said in her best professional tones, "focus on Royd. You can do it, we all know how good you are. Wait just a moment, the esperon will open it all up for you."

His pale blue eyes were clouded. "Not close enough," he muttered. "One, I'm one, tested. Good, you know I'm good, but I got to be *close*." He trembled.

She put an arm around him, stroked him, coaxed him. "The esperon will give you range," she said. "Feel it, feel yourself grow stronger. Can you feel it? Everything's getting clear, isn't it?" Her voice was a reassuring drone. "Remember the danger now, remember, go find it. Look beyond the wall, tell us about it. Tell us about Royd. Was he telling the truth? Tell us. You're good, we all know that, you can tell us." The phrases were almost an incantation.

He shrugged off her support and sat upright by himself. "I can feel it," he said. His eyes were suddenly clearer. "Something—my head hurts—I'm *afraid*!"

"Don't be afraid," the psipsych said. "The esperon won't make your head hurt, it just makes you better. Nothing to fear." She stroked his brow. "Tell us what you see."

The telepath looked at Royd's ghost with terrified little-boy eyes, and his tongue flicked across his lower lip. "He's—"

Then his skull exploded.

It was three hours later when the survivors met again to talk.

In the hysteria and confusion of the aftermath, Melantha Jhirl had taken charge. She gave orders, pushing her brandy aside and snapping out com-

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mands with the ease of one born to it, and the others seemed to find a numbing solace in doing as they were told. Three of them fetched a sheet, and wrapped the headless body of the young telepath within, and shoved it through the driveroom airlock at the end of the ship. Two others, on Melantha's order, found water and cloth and began to clean up the lounge. They did not get far. Mopping the blood from the tabletop, the cyberneticist suddenly began to retch violently. Karoly d'Branin, who had sat still and shocked since it happened, woke and took the blood-soaked rag from her hand and led her away, back to his cabin.

Melantha Jhirl was helping the psipsych, who had been standing very close to the telepath when he died. A sliver of bone had penetrated her cheek just below her right eye, she was covered with blood and pieces of flesh and bone and brain, and she had gone into shock. Melantha removed the bone splinter, led her below, cleaned her, and put her to sleep with a shot of one of her own drugs.

And, at length, she got the rest of them together in the largest of the cargo holds, where three of them slept. Seven of the surviving eight attended. The psipsych was still asleep, but the cyberneticist seemed to have recovered. She sat cross-legged on the floor, her features pale and drawn, waiting for Melantha to begin.

It was Karoly d'Branin who spoke first, however, "I do not understand," he said. "I do not understand what has happened. What could . . ."

"Royd killed him, is all," the xenotech said bitterly. "His secret was endangered, so he just—just blew him apart."

"*I* cannot believe that," Karoly d'Branin said, anguished. "I cannot. Royd and I, we have talked, talked many a night when the rest of you were sleeping. He is gentle, inquisitive, sensitive. A dreamer. He understands about the *volcryn*. He would not do such a thing."

"His holograph certainly winked out quick enough when it happened," the female linguist said. "And you'll notice he hasn't had much to say since."

"The rest of you haven't been usually talkative either," Melantha Jhirl said. "I don't know what to think, but my impulse is to side with Karoly. We have no proof that the captain was responsible for what happened."

The xenotech make a loud rude noise. "Proof."

"In fact," Melantha continued unperturbed, "I'm not even sure anyone is responsible. Nothing happened until he was given the esperon. Could the drug be at fault?"

"Hell of a side effect," the female linguist muttered.

The xenobiologist frowned. "This is not my field, but I know esperon is an extremely potent drug, with severe physical effects as well as psionic. The instrument of death was probably his own talent, augmented by the drug. Besides boosting his principal power, his telepathic sensitivity, esperon would

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also tend to bring out other psi-talents that might have been latent in him."

"Such as?" someone demanded.

"Biocontrol. Telekinesis."

Melantha Jhirl was way ahead of him. "Increase the pressure inside his skull sharply, by rushing all the blood in his body to his brain. Decrease the air pressure around his head simultaneously, using teke to induce a short-lived vacuum. Think about it."

They thought about it, and none of them liked it.

"It could have been self-induced," Karoly d'Branin said.

"Or a stronger talent could have turned his power against him," the xenotech said stubbornly.

"No human telepath has talent on that order, to seize control of someone else, body and mind and soul, even for an instant."

"Exactly," the xenotech said. "No *human* telepath."

"Gas giant people?" The cybernetic-ist's tone was mocking.

The xenotech stared her down. "I could talk about Crey sensitives or *githyanki* soulsucks, name a half-dozen others off the top of my head, but I don't need to. I'll only name one. A Hrangan Mind."

That was a disquieting thought. All of them fell silent and moved uneasily, thinking of the vast, inimicable power of a Hrangan Mind hidden in the command chambers of the *Nightflyer,* until Melantha Jhirl broke the spell. "That is ridiculous," she said. "Think of what you're saying, if that isn't too much to ask. You're supposed to be xenologists, the lot of you, experts in alien languages, psychology, biology, technology. You don't act the part. We warred with Old Hranga for a thousand years, but we *never* communicated successfully with a Hrangan Mind. If Royd Eris is a Hrangan, they've certainly improved their conversational skills in the centuries since the Collapse."

The xenotech flushed. "You're right," she mumbled. "I'm jumpy."

"Friends," Karoly d'Branin said, "we must not panic or grow hysterical. A terrible thing has happened. One of our colleagues is dead, and we do not know why. Until we do, we can only go on. This is no time for rash actions against the innocent. Perhaps, when we return to Avalon, an investigation will tell us what happened. The body is safe, is it not?"

"We cycled it through the airlock into the driveroom," said the male linguist. "Vacuum in there. It'll keep."

"And it can be examined on our return," d'Branin said, satisfied.

"That return should be immediate," the xenotech said. "Tell Eris to turn this ship around."

D'Branin looked stricken. "But the *volcryn!* A week more, and we will know them, if my figures are correct. To return would take us six weeks. Surely it is worth one week additional to know that they exist?"

The xenotech was stubborn. "A man is dead. Before he died, he talked about aliens and danger. Maybe we're in danger too. Maybe these *volcryn* are the cause, maybe they're more potent

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than even a Hrangan Mind. Do you care to risk it? And for what? Your sources may be fictional or exaggerated or wrong, your interpretations and computations may be incorrect, or they may have changed course—the *volcryn* may not even be within light-years of where we'll drop out!"

"Ah," Melantha Jhirl said, "I understand. Then we shouldn't go on because they won't be there, and besides, they might be dangerous."

D'Branin smiled and the female linguist laughed. "Not funny," said the xenotech, but she argued no more.

"No," Melantha continued, "any danger we are in will not increase significantly in the time it will take us to drop out of drive and look about for *volcryn.* We would have to drop out anyway, to reprogram. Besides, we have come a long way for these *volcryn,* and I admit to being curious." She looked at each of them in turn, but none of them disagreed. "We continue, then."

"And what do we do with Royd?" D'Branin asked.

"Treat the captain as before, if we can," Melantha said decisively. "Open lines to him and talk. He's probably as shocked and dismayed by what happened as we are, and possibly fearful that we might blame him, try to hurt him, something like that. So we reassure him. I'll do it, if no one else wants to talk to him." There were no volunteers. "All right. But the rest of you had better try to act normally."

"Also," said d'Branin, "we must continue with our preparations. Our sensory instruments must be ready for deployment as soon as we shift out of drive and reenter normal space, our computer must be functioning."

"It's up and running," the cyberneticist said quietly. "I finished this morning, as you requested." She had a thoughtful look in her eyes, but d'Branin did not notice. He turned to the linguists and began discussing some of the preliminaries he expected from them, and in a short time the talk had turned to the *volcryn,* and little by little the fear drained out of the group.

Royd, listening, was glad.

She returned to the lounge alone.

Someone had turned out the lights. "Captain?" she said, and he appeared to her, pale, glowing softly, with eyes that did not really see. His clothes, filmy and out-of-date, were all shades of white and faded blue. "Did you hear, Captain?"

His voice over the communicator betrayed a faint hint of surprise. "Yes. I hear and I see everything on my *Nightflyer,* Melantha. Not only in the lounge. Not only when the communicators and viewscreens are on. How long have you known?"

"Known?" She laughed. "Since you praised the gas giant solution to the Roydian mystery."

"I was under stress. I have never made a mistake before."

"I believe you, Captain," she said. "No matter. I'm the improved model, remember? I'd guessed weeks ago."

For a time Royd said nothing. Then: "When do you begin to reassure me?"

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"I'm doing so right now. Don't you feel reassured yet?"

The apparition gave a ghostly shrug. "I am pleased that you and Karoly do not think I murdered that man."

She smiled. Her eyes were growing accustomed to the room. By the faint light of the holograph, she could see the table where it had happened, dark stains across its top. Blood. She heard a faint dripping, and shivered. "I don't like it in here."

"If you would like to leave, I can be with you wherever you go."

"No," she said. "I'll stay. Royd, if I asked you to, would you shut off your eyes and ears throughout the ship? Except for the lounge? It would make the others feel better, I'm sure."

"They don't know."

"They will. You made that remark about gas giants in everyone's hearing. Some of them have probably figured it out by now."

"If I told you I had cut myself off, you would have no way of knowing whether it was the truth."

"I could trust you," Melantha said.

Silence. The spectre looked thoughtful. "As you wish," Royd's voice said finally. "Everything off. Now I see and hear only in here."

"I believe you."

"Did you believe my story?" Royd asked.

"Ah," she said. "A strange and wondrous story, Captain. If it's a lie, I'll swap lies with you any time. You do it well. If it's true, then you are a strange and wondrous man."

"It's true," the ghost said quietly.

"Melantha—" His voice hesitated.

"Yes."

"I watched you copulating."

She smiled. "Ah," she said. "I'm good at it."

"I wouldn't know," Royd said. "You're good to watch."

Silence. She tried not to hear the dripping. "Yes," she said after a long hesitation.

"Yes? What?"

"Yes, Royd, I would probably sex with you if it were possible."

"*How did you know what I was thinking?*"

"I'm an improved model," she said. "And no, I'm not a telepath. It wasn't so difficult to figure out. I told you, I'm three moves ahead of you."

Royd considered that for a long time. "I believe I'm reassured," he said at last.

"Good," said Melantha Jhirl. "Now reassure me."

"Of what?"

"What happened in here? Really?"

Royd said nothing.

"I think you know something," Melantha said. "You gave up your secret to stop us from injecting him with esperon. Even after your secret was forfeit, you ordered us not to go ahead. Why?"

"Esperon is a dangerous drug," Royd said.

"More than that, Captain," Melantha said. "What killed him?"

"*I* didn't."

"One of us? The *volcryn*?"

Royd said nothing.

"Is there an alien aboard your ship,

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Captain?" she asked. "Is that it?"

Silence.

"Are we in danger? Am *I* in danger, Captain? I'm not afraid. Does that make me a fool?"

"I like people," Royd said at last. "When I can stand it, I like to have passengers. I watch them, yes. It's not so terrible. I like you and Karoly especially. You have nothing to fear. I won't let anything happen to you."

"What might happen?" she asked.

Royd said nothing.

"And what about the others, Royd? Are you taking care of them, too? Or only Karoly and me?"

No reply.

"You're not very talkative tonight," Melantha observed.

"I'm under strain," his voice replied. "Go to bed, Melantha Jhirl. We've talked long enough."

"All right, Captain," she said. She smiled at his ghost and lifted her hand. His own rose to meet it. Warm dark flesh and pale radiance brushed, melded, were one. Melantha Jhirl turned to go. It was not until she was out in the corridor, safe in the light once more, that she began to tremble.

False midnight. The talks had broken up, the nightmares had faded, and the academicians were lost in sleep. Even Karoly d'Branin slept, his appetite for chocolate quelled by his memories of the lounge.

In the darkness of the largest cargo hold, three sleepwebs hung, sleepers snoring softly in two. The cyberneticist lay awake, thinking, in the third. Finally she rose, dropped lightly to the floor, pulled on her jumpsuit and boots, and shook the xenotech from her slumber. "Come," she whispered, beckoning. They stole off into the corridor, leaving Melantha Jhirl to her dreams.

"What the hell," the xenotech muttered when they were safely beyond the door. She was half-dressed, disarrayed, unhappy.

"There's a way to find out if Royd's story was true," the cyberneticist said carefully. "Melantha won't like it, though. Are you game to try?"

"What?" the other asked. Her face betrayed her interest.

"Come," the cyberneticist said.

One of the three lesser cargo holds had been converted into a computer room. They entered quietly; all empty. The system was up, but dormant. Currents of light ran silkily down crystalline channels in the data grids, meeting, joining, splitting apart again; rivers of wan multihued radiance crisscrossing a black landscape. The chamber was dim, the only noise a low buzz at the edge of human hearing, until the cyberneticist moved through it, touching keys, tripping switches, directing the silent luminescent currents. Slowly the machine woke.

"What are you *doing*?" the xenotech said.

"Karoly told me to tie in our system with the ship," the cyberneticist replied as she worked. "I was told Royd wanted to study the *volcryn* data. Fine, I did it. Do you understand what that means?"

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Now the xenotech was eager. "The two systems are tied together!"

"Exactly. So Royd can find out about the *volcryn,* and we can find out about Royd." She frowned. "I wish I knew more about the *Nightflyer's* hardware, but I think I can feel my way through. This is a pretty sophisticated system d'Branin requisitioned."

"Can you take over?" the xenotech asked excitedly.

"Take over?" The cyberneticist sounded puzzled. "You been drinking again?"

"No, I'm serious. Use your system to break into the ship's control, overwhelm Eris, countermand his orders, make the *Nightflyer* respond to us, down here."

"Maybe," the cyberneticist said doubtfully, slowly. "I could try, but why do that?"

"Just in case. We don't have to use the capacity. Just so we have it, if an emergency arises."

The cyberneticist shrugged. "Emergencies and gas giants. I only want to put my mind at rest about Royd." She moved over to a readout panel, where a half-dozen meter-square viewscreens curved around a console, and brought one of them to life. Long fingers brushed across holographic keys that appeared and disappeared as she touched them, the keyboard changing shape even as she used it. Characters began to flow across the viewscreen, red flickerings encased in glassy black depths. The cyberneticist watched, and finally froze them. "Here," she said, "here's my answer about the hardware. You can dismiss your takeover idea, unless those gas giant people of yours are going to help. The *Nightflyer's* bigger and smarter than our little system here. Makes sense, when you stop to think about it. Ship's all automated, except for Royd." She whistled and coaxed her search program with soft words of encouragement. "It looks as though there *is* a Royd, though. Configurations are all wrong for a robot ship. Damn, I would have bet anything." The characters began to flow again, the cyberneticist watching the figures as they drifted by. "Here's life support specs, might tell us something." A finger jabbed, and the screen froze once more.

"Nothing unusual," the xenotech said in disappointment.

"Standard waste disposal. Water recycling. Food processor, with protein and vitamin supplements in stores." She began to whistle. "Tanks of Renny's moss and neograss to eat up the CO_2. Oxygen cycle, then. No methane or ammonia. Sorry about that."

"Go sex with a computer."

The cyberneticist smiled. "Ever tried it?" Her fingers moved again. "What else should I look for? Give me some ideas."

"Check the specs for nurturant tanks, cloning equipment, that sort of thing. Find Royd's life history. His mother's. Get a readout on the business they've done, all this alleged trading." Her voice grew excited, and she took the cyberneticist by her shoulder. "A log, a ship's log! There's

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got to be a log. Find it! You must!"

"All right." She whistled, happy, one with her systems, riding the data winds, in control, curious. The readout screen turned a bright red and began to blink at her, but she only smiled. "Security," she said, her fingers a blur. As suddenly as it had come, the blinking red field was gone. "Nothing like slipping past another system's security. Like slipping onto a man."

Down the corridor, an alarm sounded a whooping call. "Damn," the cyberneticist said, "that'll wake everyone." She glanced up when the xenotech's fingers dug painfully into her shoulder, *squeezing, hurting.*

A grey steel panel slid almost silently across the access to the corridor. "Wha—?" the cyberneticist said.

"That's an emergency airseal," the xenotech said in a dead voice. She knew starships. "It closes when they're about to load or unload cargo in vacuum."

Their eyes went to the huge curving outer airlock above their heads. The inner lock was almost completely open, and as they watched it clicked into place, and the seal on the outer door cracked, and now it was open half a meter, sliding, and beyond was twisted nothingness so bright it burned the eyes.

"Oh," the cyberneticist said. She had stopped whistling.

Alarms were hooting everywhere. The passengers began to stir. Melantha Jhirl leapt from her sleepweb and darted into the corridor, nude, concerned, alert. Karoly d'Branin sat up drowsily. The psipsych muttered fitfully in her drug-induced sleep. The xenobiologist cried out in alarm.

Far away metal crunched and tore, and a violent shudder ran through the ship, throwing the linguists out of their sleepwebs, knocking Melantha from her feet.

In the command quarters of the *Nightflyer* was a spherical room with featureless white walls, a lesser sphere —a control console—suspended in its center. The walls were always blank when the ship was in drive; the warped and glaring underside of spacetime was *painful to behold.*

But now darkness woke in the room, a holoscape coming to life, cold black and stars everywhere, points of icy unwinking brilliance, no up and no down and no direction, the floating control sphere the only feature in the simulated sea of night.

The *Nightflyer* had shifted out of drive.

Melantha Jhirl found her feet again and thumbed on a communicator. The alarms were still hooting, and it was hard to hear. "Captain," she shouted, "what's happening?"

"I don't know," Royd's voice replied. "I'm trying to find out. Wait here. Gather the others to you."

She did as he had said, and only when they were all together in the corridor did she slip back to her web to don some clothing. She found only six of them. The psipsych was still unconscious and could not be roused, and

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they had to carry her. And the xenotech and cyberneticist were missing. The rest looked uneasily at the seal that blocked cargo hold three.

The communicator came back to life as the alarms died. "We have returned to normal space," Royd's voice said, "but the ship is damaged. Hold three, your computer room, was breached while we were under drive. It was ripped apart by the flux. The computer automatically dropped us out of drive, or the drive forces might have torn my entire ship apart."

"Royd," d'Branin said, "two of my team are . . ."

"It appears that your computer was in use when the hold was breached," Royd said carefully. "We can only assume that they are dead. I cannot be sure. At Melantha's request, I have deactivated most of my eyes and ears, retaining only the lounge inputs. I do not know what happened. But this is a small ship, Karoly, and if they are not with you, we must assume the worst." He paused briefly. "If it is any consolation, they died quickly and painlessly."

The two linguists exchanged a long, meaningful look. The xenobiologist's face was red and angry, and he started to say something. Melantha Jhirl slipped her hand over his mouth firmly. "Do we know how it happened, Captain?" she asked.

"Yes," he said, reluctantly.

The xenobiologist had taken the hint, and Melantha took away her hand to let him breathe. "Royd?" she prompted.

"It sounds insane, Melantha," his voice replied, "but it appears your colleagues opened the hold's loading lock. I doubt that they did so deliberately, of course. They were apparently using the system interface to gain entry to the *Nightflyer's* data storage and controls."

"I see," Melantha said. "A terrible tragedy."

"Yes," Royd agreed. "Perhaps more terrible than you think. I have yet to assess the damage to my ship."

"We should not keep you, Captain, if you have duties to perform," Melantha said. "All of us are shocked, and it is difficult to talk now. Investigate the condition of your ship, and we'll continue our discussion in the morning. All right?"

"Yes," Royd said.

Melantha thumbed the communicator plate. Now officially, the device was off. Royd could not hear them.

Karoly d'Branin shook his large, grizzled head. The linguists sat close to one another, hands touching. The psipsych slept. Only the xenobiologist met her gaze. "Do you believe him?" he snapped abruptly.

"I don't know," Melantha Jhirl said, "but I do know that the other three cargo holds can all be flushed just as hold three was. I'm moving my sleepweb into a cabin. I suggest those who are living in hold two do the same."

"Good idea," the female linguist said. "We can crowd in. It won't be comfortable, but I don't think I'd sleep the sleep of angels in the holds anymore."

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"We should also take our suits out of storage in four and keep them close at hand," her partner suggested.

"If you wish," Melantha said. "It's possible that all the locks might pop open simultaneously. Royd can't fault us for taking precautions." She flashed a grim smile. "After today, we've earned the right to act irrationally."

"This is no time for your damned jokes, Melantha," the xenobiologist said, fury in his voice. "Three dead, a fourth maybe deranged or comatose, the rest of us endangered—"

"We still have no idea what is happening," she pointed out.

"*Royd Eris is killing us!*" he shouted, pounding his fist into an open palm to emphasize his point. "I don't know who or what he is and I don't know if that story he gave us is true, and I don't *care*. Maybe he's a Hrangan Mind or the avenging angel of the *volcryn* or the second coming of Jesus Christ. What the hell difference does it make? *He's killing us*!"

"You realize," Melantha said gently, "that we cannot actually know whether the good captain has turned off his inputs down here. He could be watching and listening to us right now. He isn't, of course. He told me he wouldn't and I believe him. But we have only his word on that. Now, *you* don't appear to trust Royd. If that's so, you can hardly put any faith in his promises. It follows that from your point of view it might not be wise to say the things that you're saying." She smiled slyly.

The xenobiologist was silent.

"The computer is gone, then," Karoly d'Branin said in a low voice before Melantha could resume.

She nodded. "I'm afraid so."

He rose unsteadily to his feet. "I have a small unit in my cabin," he said. "A wrist model, perhaps it will suffice. I must get the figures from Royd, learn where we have dropped out. The *volcryn*—" He shuffled off down the corridor and disappeared into his cabin.

"Think how distraught he'd be if *all* of us were dead," the female linguist said bitterly. "Then he'd have no one to help him look for *volcryn*."

"Let him go," Melantha said. "He is as hurt as any of us, maybe more so. He wears it differently. His obsessions are his defense."

"What's *our* defense?"

"Ah," said Melantha. "Patience, maybe. All of the dead were trying to breach Royd's secret when they died. We haven't tried. Here we sit discussing their deaths."

"You don't find that suspicious?"

"Very," Melantha Jhirl said. "I even have a method of testing my suspicions. One of us can make yet another attempt to find out whether our captain told us the truth. If he or she dies, we'll know." She stood up abruptly. "Forgive me, however, if I'm not the one who tries. But don't let me stop you if you have the urge. I'll note the results with interest. Until then, I'm going to move out of the cargo area and get some sleep."

"Arrogant bitch," the male linguist observed almost conversationally after Melantha had left.

"Do you think he can hear us?" the

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xenobiologist whispered quietly.

"Every pithy word," the female linguist said, rising. They all stood up. "Let's move our things and put her"—she jerked a thumb at the psipsych—"back to bed." Her partner nodded.

"Aren't we going to *do* anything?" the xenobiologist said. "Make plans. Defenses."

The linguist gave him a withering look, and pulled her companion off in the other direction.

"Melantha? Karoly?"

She woke quickly, alert at the mere whisper of her name, and sat up in the narrow bunk. Next to her, Karoly d'Branin moaned softly and rolled over, yawning.

"Royd?" she asked. "Is it morning now?"

"Yes," replied the voice from the walls. "We are drifting in interstellar space three light-years from the nearest star, however. In such a context, does morning have meaning?"

Melantha laughed. "Debate it with Karoly, when he wakes up enough to listen. Royd, you said *drifting*? How bad . . .?"

"Serious," he said, "but not dangerous. Hold three is a complete ruin, hanging from my ship like a broken metal eggshell, but the damage was confined. The drives themselves are intact, and the *Nightflyer's* computers did not seem to suffer from your machine's destruction. I feared they might. Electronic death trauma."

D'Branin said, "Eh? Royd?"

Melantha patted him. "I'll tell you later, Karoly," she said. "Royd, you sound serious. Is there more?"

"I am worried about our return flight, Melantha," he said. "When I take the *Nightflyer* back into drive, the flux will be playing directly on portions of the ship that were never engineered to withstand it. The airseal across hold three is a particular concern. I've run some projections, and I don't know if it can take the stress. If it bursts, my whole ship will split apart in the middle. My engines will go shunting off by themselves, and the rest . . ."

"I see. Is there anything we can do?"

"Yes. The exposed areas would be easy enough to reinforce. The outer hull is armored to withstand the warping forces, of course. We could mount it in place, a crude shield, but it would suffice. Large portions of the hull were torn loose when the locks opened, but they are still out there, floating within a kilometer or two, and could be used."

At some point, Karoly d'Branin had come awake. "My team has four vacuum sleds. We can retrieve these pieces for you."

"Fine, Karoly, but that is not my primary concern. My ship is self-repairing within certain limits, but this exceeds those limits. I will have to do this myself."

"You?" d'Branin said. "Friend, you said—that is, your muscles, your weakness—cannot we help with this?"

"I am only a cripple in a gravity field, Karoly," Royd said. "Weightless, I am in my element, and I will be killing our gravity grid momentarily, to try to gather my own strength for the

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repair work. No, you misunderstand. I am capable of the work. I have the tools, and my own heavy-duty sled."

"I think I know what you are concerned about," Melantha said.

"I'm glad," Royd said. "Perhaps, then, you can answer my question. If I emerge from the safety of my chambers, can you keep your friends from killing me?"

Karoly d'Branin was shocked. "Royd, Royd, we are scholars, we are not soldiers or criminals, we do not—we are human, how can you think that we would threaten you?"

"Human," Royd repeated, "but alien to me, suspicious of me. Give me no false assurances, Karoly."

The administrator sputtered. Melantha took his hand and bid him quiet. "Royd," she said, "I won't lie to you. You'd be in some danger. But I'd hope that, by coming out, you'd make the rest of them joyously happy. They'd be able to see that you told the truth, wouldn't they?"

"They would," Royd said, "but would it be enough to offset their suspicions? They believe I killed your friends, do they not?"

"Some, perhaps. Half believe it, half fear it. They are frightened, Captain. *I* am frightened."

"No more than I."

"I would be less frightened if I knew what *did* happen. Do you know?"

Silence.

"Royd, if . . . "

"I tried to stop the esperon injection," he said. "I might have saved the other two, if I had seen them, heard them, known what they were about. But you made me turn off my monitors, Melantha. I cannot help what I cannot see." Hesitation. "I would feel safer if I could turn them back on. I am blind and deaf. It is frustrating. I cannot help if I am blind and deaf."

"Turn them on, then," Melantha said suddenly. "I was wrong. I did not understand. Now I do, though."

"Understand what?" Karoly said.

"You do not understand," Royd said. "You do *not*. Don't pretend that you do, Melantha Jhirl. *Don't*!" The calm voice from the communicator was shrill with emotion.

"What?" Karoly said. "Melantha, I do not understand."

Her eyes were thoughtful. "Neither do I," she said. "Neither do I, Karoly." She kissed him lightly. "Royd," she resumed, "it seems to me you must make this repair, regardless of what promises we can give you. You won't risk your ship by slipping back into drive in your present condition. The only other option is to drift here until we all die. What choice do we have?"

"I have a choice," Royd said with deadly seriousness. "I could kill all of you, if that were the only way to save my ship."

"You could try," Melantha said.

"Let us have no more talk of death," d'Branin said.

"You are right, Karoly," Royd said. "I do not wish to kill any of you. But I must be protected."

"You will be," Melantha said. "Karoly can set the others to chasing your hull fragments. I'll never leave

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your side. I'll assist you; the work will be done three times as fast."

Royd was polite. "In my experience, most planet-bound are clumsy and easily tired in weightlessness. It would be more efficient if I worked alone."

"It would not," she replied. "I remind you that I'm the improved model, Captain. Good in free-fall as well as in bed. I'll help."

"As you will. In a few moments, I shall depower the gravity grid. Karoly, go and prepare your people. Unship your sled and suit up. I will exit *Nightflyer* in three hours, after I have recovered from the pains of your gravity. I want all of you outside the ship when I leave."

It was as though some vast animal had taken a bite out of the universe.

Melantha Jhirl waited on her sled close by the *Nightflyer,* and looked at stars. It was not so very different out here, in the depths of interstellar space. The stars were cold, frozen points of light; unwinking, austere, more chill and uncaring somehow than the same suns made to dance and twinkle by an atmosphere. Only the absence of a landmark primary reminded her of where she was: in the places between, where men do not stop, where the *volcryn* sail ships impossibly ancient. She tried to pick out Avalon's sun, but she did not know where to search. The configurations were strange to her, and she had no idea of how she was oriented. Behind her, before her, above, all around, the starfields stretched endlessly. She glanced down, beneath her sled and the *Nightflyer,* expecting still more alien stars, and the bite hit her with an almost physical force.

Melantha fought off a wave of vertigo. She was suspended above a pit, a yawning chasm in the universe, black starless, vast.

Empty.

She remembered then: the Tempter's Veil. Just a cloud of dark gas, nothing really, galactic pollution that obscured the light from the stars of the Fringe. But this close at hand, it looked immense, terrifying. She had to break her gaze when she began to feel as if she were falling. It was a gulf beneath her and the frail silver-white shell of the *Nightflyer,* a gulf about to swallow them.

Melantha touched one of the controls on the sled's forked handle, swinging around so the Veil was to her side instead of beneath her. That seemed to help, somehow. She concentrated on the *Nightflyer.* It was the largest object in her universe, brightly-lit, ungainly; three small eggs side-by-side, two larger spheres beneath and at right angles, lengths of tube connecting it all. One of the eggs was shattered now, giving the craft an unbalanced cast.

She could see the other sleds as they angled through the black, tracking the missing pieces of eggshell, grappling with them, bringing them back. The linguistic team worked together, as always, sharing a sled. The xenobiologist was alone. Karoly d'Branin had a silent passenger; the psipsych, freshly drugged, asleep in the suit they had dressed her in. Royd had insisted that

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the ship be cleared completely, and it would have taken time and care to rouse the psipsych to consciousness; this was the safer course.

While her colleagues labored, Melantha Jhirl waited for Royd Eris, talking to the others occasionally over the comm link. The two linguists, unaccustomed to weightlessness, were complaining a lot. Karoly tried to soothe them. The xenobiologist worked in silence, argued out. He had been vehement earlier in his opposition to going outside, but Melantha and Karoly had finally worn him down and it seemed as if he had nothing more to say. Melantha now watched him flit across her field of vision, a stick figure in form-fitting black armor standing stiff and erect at the controls of his sled.

At last the circular airlock atop the foremost of the *Nightflyer's* major spheres dilated, and Royd Eris emerged. She watched him approach, wondering what he would look like. She had so many different pictures. His genteel, cultured, too-formal voice sometimes reminded her of the dark aristocrats of her native Prometheus, the wizards who toyed with human genes. At other times his naîvete made her think of him as an inexperienced youth. His ghost was a tired looking thin young man, and he was supposed to be considerably older than that pale shadow, but Melantha found it difficult to hear an old man talking when he spoke.

Royd's sled was larger than theirs and of a different design; a long oval plate with eight jointed grappling arms bristling from its underside like the legs of a metal spider, and the snout of a heavy-duty cutting laser mounted above. His suit was odd too, more massive than the Academy worksuits, with a bulge between its shoulder blades that was probably a powerpack, and rakish radiant fins atop shoulders and helmet.

But when he was finally near enough for Melantha to see his face, it was just a face. White, very white, that was the predominant impression she got; white hair cropped very short, a white stubble around the sharply-chiseled lines of his jaw, almost invisible eyebrows beneath which blue eyes moved restlessly. His skin was pale and unlined, scarcely touched by time.

He looked wary, she thought. And perhaps a bit frightened.

He stopped his sled close to hers, amid the twisted ruin that had been cargo hold three, and surveyed the damage, the pieces of floating wreckage that once had been flesh and blood, glass, metal, plastic. Hard to distinguish now, all of them fused and burned and frozen together. "We have a good deal of work to do, Melantha," he said.

"First let's talk," she replied. She shifted her sled closer and reached out to him, but the distance was still too great, the width of the two vacuum sleds keeping them apart. Melantha backed off, and turned herself over completely, so that Royd hung upside down in her world and she upside

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down in his. Then she moved towards him again, positioning her sled directly over/under his. Their gloved hands met, brushed, parted. Melantha adjusted her altitude. Their helmets touched.

"I don't—" Royd began to say uncertainly.

"Turn off your comm," she commanded. "The sound will carry through the helmets."

He blinked and used his tongue controls and it was done.

"Now we can talk," she said.

"I do not like this, Melantha," he said. "This is too obvious. This is dangerous."

"There's no other way," she said. "Royd, I *do* know."

"Yes, " he said. "I knew you did. Three moves ahead, Melantha. I remember the way you play chess. You are safer if you feign ignorance, however."

"I understand that, Captain. Other things I'm less sure about. Can we talk about it?"

"No. Don't ask me to. Just do as I tell you. You are in danger, all of you, but I can protect you. The less you know, the better I can protect you." Through the transparent faceplates, his expression was grim.

She stared into his upside-down eyes. "Your ship is killing us, Captain. That's my suspicion, anyway. Not you. It. Only that doesn't make sense. You command the *Nightflyer.* How can it act independently? And why? What motive? How was that psionic murder accomplished? It can't be the ship. Yet it can't be anything else. Help me, Captain."

He blinked; there was anguish behind his eyes. "I should never have accepted Karoly's charter. Not with a telepath among you. It was risky. But I wanted to see the *volcryn.*

"You understand too much already, Melantha," Royd continued. "I can't tell you more. The ship is malfunctioning, that is all you need know. It is not safe to push too hard. As long as I am at the controls, however, you and your colleagues are in small danger. Trust me."

"Trust is a two-way bond," Melantha said steadily.

Royd lifted his hand and pushed her away, then tongued his comm back to life. "Enough gossip," he briskly announced. "We have repairs to make. Come. I want to see just how improved you are."

In the solitude of her helmet, Melantha Jhirl swore softly.

The xenobiologist watched Royd Eris emerge on his oversized work sled, watched Melantha Jhirl move to him, watched as she turned over and pressed her faceplate to his. He could scarcely contain his rage. Somehow they were all in it together, Royd and Melantha and possibly old d'Branin as well, he thought sourly. She had protected him from the first, when they might have taken action together, stopped him, found out who or what he was. And now three were dead, killed by the cipher in the misshapen spacesuit, and Melantha

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hung upside down, her face pressed to his like lovers kissing.

He tongued off his comm and cursed. The others were out of sight, off chasing spinning wedges of half-slagged metal. Royd and Melantha were engrossed in each other, the ship abandoned and vulnerable. This was his chance. No wonder Eris had insisted that all of them precede him into the void; outside, isolated from the controls of the *Nightflyer,* he was only a man. A weak one at that.

Smiling a thin hard smile, the xenobiologist brought his sled around in a wide circle and vanished into the gaping maw of the driveroom. His lights flickered past the ring of nukes and sent long bright streaks along the sides of the closed cylinders of the stardrives, the huge engines that bent the stuff of spacetime, encased in webs of metal and crystal. Everything was open to the vacuum. It was better that way; atmosphere corroded and destroyed.

He set the sled down, dismounted, moved to the airlock. This was the hardest part, he thought. The headless body of the young telepath was tethered loosely to a massive support strut, a grisly guardian by the door. The xenobiologist had to stare at it while he waited for the lock to cycle. Whenever he glanced away, somehow he would find his eyes creeping back to it. The body looked almost natural, as if it had never had a head. The xenobiologist tried to remember the young man's face, and failed, but then the lock door slid open and he gratefully pushed the thought away and entered.

He was alone in the *Nightflyer.*

A cautious man, he kept his suit on, though he collapsed the helmet and yanked loose the suddenly-limp metallic fabric so it fell behind his back like a hood. He could snap it in place quickly enough if the need arose. In cargo hold four, where they had stored their equipment, the xenobiologist found what he was looking for; a portable cutting laser, charged and ready. Low power, but it would do.

Slow and clumsy in weightlessness, he pulled himself through the corridor into the darkened lounge.

It was chilly inside, the air cold on his cheeks. He tried not to notice. He braced himself at the door and pushed off across the width of the room, sailing above the furniture, which was all safely bolted into place.

As he drifted toward his objective, something wet and cold touched his face. It startled him, but it was gone before he could make out what it was.

When it happened again, he snatched at it, caught it, and felt briefly sick. He had forgotten. No one had cleaned the lounge yet. The—*remains* were still there, floating now, blood and flesh and bits of bone and brain. All around him.

He reached the far wall, stopped himself with his arms, pulled himself down to where he wanted to go. The bulkhead. The wall. No doorway was visible, but the metal couldn't be very thick. Beyond was the control room, the computer access, safety, power. The xenobiologist did not think of himself as a vindictive man. He did not

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intend to harm Royd Eris, that judgment was not his to make. He would take control of the *Nightflyer,* warn Eris away, make certain the man stayed sealed in his suit. He would take them all back without any more mysteries, any more killings. The Academy arbiters could listen to the story, and probe Eris, and decide the right and wrong of it, guilt and innocence, what should be done.

The cutting laser emitted a thin pencil of scarlet light. The xenobiologist smiled and applied it to the bulkhead. It was slow work, but he had patience. They would not have missed him, quiet as he'd been, and if they did they would assume he was off sledding after some hunk of salvage. Eris' repairs would take hours, maybe days, to finish. The bright blade of the laser smoked where it touched the metal. He applied himself diligently.

Something moved on the periphery of his vision, just a little flicker, barely seen. A floating bit of brain, he thought. A sliver of bone. A bloody piece of flesh, hair still hanging from it. Horrible things, but nothing to worry about. He was a biologist, he was used to blood and brains and flesh. And worse, and worse; he had dissected many an alien in his day.

Again the motion caught his eye, teased at it. Not wanting to, he found himself drawn to look. He could not *not* look, somehow, just as he had been unable to ignore the headless telepath in the airlock. He looked.

It was an eye.

The xenobiologist trembled and the laser slipped sharply off to one side, so he had to wrestle with it to bring it back to the channel he was cutting. His heart raced. He tried to calm himself. Nothing to be frightened of. No one was home, and if Royd should return, well, he had the laser as a weapon and he had his suit on if an airlock blew.

He looked at the eye again, willing away his fear. It was just an eye, the eye of the young telepath, intact, bloody but intact, the same watery blue eye the boy had when alive, nothing supernatural. A piece of dead flesh, floating in the lounge amid other pieces of dead flesh. Someone should have cleaned up the lounge, he thought angrily. It was indecent to leave it like this, it was uncivilized.

The eye did not move. The other grisly bits were drifting on the air currents that flowed across the room, but the eye was still. Fixed on him. Staring.

He cursed himself and concentrated on the laser, on his cutting. He had burned an almost straight line up the bulkhead for about a meter. He began another at right angles.

The eye watched dispassionately. The xenobiologist suddenly found he could not stand it. One hand released its grip on the laser, reached out, caught the eye, flung it across the room. The action made him lose balance. He tumbled backward, the laser slipping from his grasp, his arms flapping like the wings on some absurd heavy bird. Finally he caught an edge of the table and stopped himself.

The laser hung in the center of the room, still firing, turning slowly where it

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floated. That did not make sense. It should have ceased fire when he released it. A malfunction, he thought. Smoke rose from where the thin line of the laser traced a path across the carpet.

With a shiver of fear, the xenobiologist realized that the laser was turning towards him.

He raised himself, put both hands flat against the table, pushed off out of the way.

The laser was turning more swiftly now.

He slammed into a wall, grunted in pain, bounced off the floor, kicked. The laser was spinning quickly, chasing him. He soared, braced himself for a ricochet off the ceiling. The beam swung around, but not fast enough. He'd get it while it was still firing off in the other direction.

He moved close, reached, and saw the eye.

It hung just above the laser. Staring.

The xenobiologist made a small whimpering sound low in his throat, and his hand hesitated—not long, but long enough—and the scarlet beam came up and around.

Its touch was a light, hot caress across his neck.

It was more than an hour later before they missed him. Karoly d'Branin noticed his absence first, called for him over the comm net, and got no answer. He discussed it with the others.

Royd Eris moved his sled back from the armor plate he had just mounted, and through his helmet Melantha Jhirl could see the lines around his mouth grow hard. His eyes were sharply alert.

It was just then that the screaming began.

A shrill bleat of pain and fear, followed by choked, anguished sobbing. They all heard it. It came over the comm net and filled their helmets.

"It's him," a woman's voice said. The linguist.

"He's hurt," her partner added. "He's crying for help. Can't you hear it?"

"Where—?" someone started.

"The ship," the female linguist said. "He must have returned to the ship."

Royd Eris said, "No. I warned—"

"We're going to go check," the linguist said. Her partner cut free the hull fragment they had been towing, and it spun away, tumbling. Their sled angled down towards the *Nightflyer.*

"Stop," Royd said. "I'll return to my chambers and check from there, if you wish. Stay outside until I give you clearance."

"Go to hell," the linguist snapped at him over the open circuit.

"Royd, my friend, what can you mean?" Karoly d'Branin said. His sled was in motion too, hastening after the linguists, but he had been further out and it was a long way back to the ship. "He is hurt, perhaps seriously. We must help."

"No," Royd said. "Karoly, *stop.* If your colleague went back to the ship alone, he is dead."

"How do you know that?" the male linguist demanded. "Did you arrange it? Set traps?"

"Listen to me," Royd continued.

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"You can't help him now. Only I could have helped him, and he did not listen to me. Trust me. Stop."

In the distance, d'Branin's sled slowed. The linguists did not. "We've already listened to you too damn much, I'd say," the woman said. She almost had to shout to be heard above the sobs and whimpers, the agonized sounds that filed their universe. "Melantha," she said, "keep Eris right where he is. We'll go carefully, find out what is happening inside, but I don't want him getting back to his controls. Understood?"

Melantha Jhirl, hesitated. Sounds of terror and agony beat against her ears; it was hard to think.

Royd swung his sled around to face her, and she could feel the weight of his stare. "Stop them," he said. "Melantha, Karoly, order it. They do not know what they are doing." His voice was edged with despair.

In his face, Melantha found decision. "Go back inside quickly, Royd. Do what you can. I'm going to try to intercept them."

He nodded to her across the gulf, but Melantha was already in motion. Her sled backed clear of the work area, congested with hull fragments and other debris, then accelerated briskly as she raced toward the rear of the *Nightflyer.*

But even as she approached, she knew it was too late. The linguists were too close, and already moving much faster than she was.

"*Don't,*" she said, authority in her tone. "The ship isn't safe, damn it."

"Bitch," was all the answer she got.

Karoly's sled pursued vainly. "Friends, you must stop, please, I beg it of you, let us talk this out together."

The unending whimpers were his only reply.

"I am your superior," he said. "I order you to wait outside. Do you hear me? I order it, I invoke the authority of the Academy. Please, my friends, please listen to me."

Melantha watched as the linguists vanished down the long tunnel of the driveroom.

A moment later she halted her sled near the waiting black mouth, debating whether she should follow them into the *Nightflyer.* She might be able to catch them before the airlock opened.

Royd's voice, hoarse counterpoint to the crying, answered her unvoiced question. "Stay, Melantha. Proceed no further."

She looked behind her. Royd's sled was approaching.

"What are you doing?" she demanded. "Royd, use your own lock. You have to get back inside!"

"Melantha," he said calmly, "I cannot. The ship will not respond to me. The control lock will not dilate. I don't want you or Karoly inside the ship until I can return to my controls."

Melantha Jhirl looked down the shadowed barrel of the driveroom, where the linguists had vanished.

"What will—?"

"Beg them to come back, Melantha. Plead with them. Perhaps there is still time, if they will listen to you."

She tried. Karoly d'Branin tried too. The crying, the moaning, the twisted

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symphony went on and on. But they could not raise the two linguists at all.

"They've cut out their comm," Melantha said furiously. "They don't want to listen to us. Or that...that *sound*."

Royd's sled and Karoly d'Branin's reached her at the same time. "I do not understand," Karoly said. "What is happening?"

"It is simple, Karoly," Royd replied. "I am being kept outside until—until Mother is done with them."

The linguists left their vacuum sled next to the one the xenobiologist had abandoned and cycled through the airlock in unseemly haste, with hardly a glance for the grim headless doorman.

Inside they paused briefly to collapse their helmets. "I can still hear him," the man said.

The woman nodded. "The sound is coming from the lounge. Hurry."

They kicked and pulled their way down the corridor in less than a minute. The sounds grew steadily louder, nearer. "He's in there," the woman said when they reached the chamber door.

"Yes," her partner said, "but is he alone? We need a weapon. What if... Royd had to be lying. There *is* someone else on board. We need to defend ourselves."

The woman would not wait. "There are two of us," she said. "Come *on*!" With that she launched herself through the doorway and into the lounge.

It was dark inside. What little light there was spilled through the door from the corridor. Her eyes took a long moment to adjust. "Where are you?" she cried in confusion. The lounge seemed empty, but maybe it was only the light.

"Follow the sound," the man suggested. He stood in the door, glancing warily about for a minute, before he began to feel his way down a wall, groping with his hands.

The woman, impatient, propelled herself across the room, searching. She brushed against a wall in the kitchen area, and that made her think of weapons. She knew where the utensils were stored. "Here," she said. "Here, I've got a knife, that should thrill you." She waved it, and brushed against a floating bubble of blood as big as her fist. It burst and reformed into a hundred smaller globules.

"Oh, merciful God," the man said in a voice thick with fear.

"What?" she demanded. "Did you find him? Is he—?"

He was fumbling his way back towards the door, creeping along the wall the way he had come. "Get out of here," he warned. "Oh, *hurry*."

"Why?" She trembled despite herself.

"I found the source," he said. "The screams, the crying. Come *on*!"

"Wha—"

He whimpered. "It was the grill. Oh, don't you see? It's coming from the communicator!" He reached the door, and sighed audibly, and he did not wait for her. He bolted down the corridor and was gone.

She braced herself and positioned

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herself in order to follow him.

The sounds stopped. Just like that: turned off.

She kicked, floated towards the door, knife in hand.

Something dark crawled from beneath the dinner table and rose to block her path. She saw it clearly for a moment, outlined in the light from the corridor. The xenobiologist, still in his vacuum suit, but with his helmet pulled off. He had something in his hands that he raised to point at her. It was a laser, she saw, a simple cutting laser.

She was moving straight towards him. She flailed and tried to stop herself, but she could not.

When she got quite close, she saw that he had a second mouth below his chin, and it was grinning at her, and little droplets of blood flew from it, wetly, as he moved.

The man rushed down the corridor in a frenzy of fear, bruising himself as he smashed into walls. Panic and weightlessness made him clumsy. He kept glancing over his shoulder as he fled, hoping to see his lover coming after him, but terrified of what he might see in her stead.

It took a long, *long* time for the airlock to open. As he waited, trembling, his pulse began to slow. He steadied himself with an effort. Once inside the chamber, with the inner door sealed between him and the lounge, he began to feel safe.

Suddenly he could barely remember why he had been so terrified.

And he was ashamed; he had run, abandoned her. And for what? What had frightened him so? An empty lounge? Noises from a communicator? Why, that only meant the xenobiologist was alive somewhere else in the ship, in pain, spilling his agony into a comm unit.

Resolute, he reached out and killed the cycle on the airlock, then reversed it. The air that had been partially sucked out came gusting back into the chamber.

The man shook his head ruefully. He'd hear no end of this, he knew. She would never let him forget it. But at least he would return, and apologize. That would count for something.

As the inner door rolled back, he felt a brief flash of fear again, an instant of stark terror when he wondered what might have emerged from the lounge to wait for him in the corridors of the *Nightflyer*. He willed it away.

When he stepped out, she was waiting for him.

He could see neither anger nor disdain in her curiously calm features, but he pushed himself towards her and tried to frame a plea for forgiveness anyway. "I don't know why I—"

With languid grace, her hand came out from behind her back. The knife was in it. That was when he finally noticed the hole burned in her suit, just between her breasts.

"Your *mother*?" Melantha Jhirl said incredulously as they hung helpless in the emptiness beyond the ship.

"She can hear everything we say," Royd replied. "But at this point, it no

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longer makes any difference. Your friend must have done something very foolish, very threatening. Now she is determined to kill you all."

"She, she, what do you mean?" D'Branin's voice was puzzled. "Royd, surely you do not tell us that your mother is still alive. You said she died even before you were born."

"She did, Karoly," Royd said. "I did not lie to you."

"No," Melantha said. "I didn't think so. But you did not tell us the whole truth, either."

Royd nodded. "Mother is dead, but her—ghost still lives, and animates my *Nightflyer*." He chuckled grimly. "Perhaps it would be more fitting to say her *Nightflyer*. My control is tenuous at best."

"Royd," d'Branin said, "my *volcryn* are more real than any ghosts." His voice chided gently.

"I don't believe in ghosts either," Melantha Jhirl said with a frown.

"Call it what you will, then," Royd said. "My term is as good as any. The reality is unchanged. My mother, or some part of my mother, lives in the *Nightflyer,* and she is killing you all as she has killed others before."

"Royd, you do not make sense," d'Branin said. "I—"

"Karoly, let the captain explain."

"Yes," Royd said. "The *Nightflyer* is very—very *advanced,* you know. Automated, self-repairing, large. It had to be, if Mother were to be freed from the necessity of crew. It was built on Newholme, you will recall. I have never been there, but I understand that Newholme's technology is quite sophisticated. Avalon could not duplicate this ship, I suspect. There are few worlds that could."

"The point, Captain?"

"The point—the point is the computers, Melantha. They had to be ex-

IN TIMES TO COME

● Our April cover, by Bob Shore, may strike you as a bit unusual, but you'll soon see how it relates to our lead novella. "Scholar's Cluster" is a tongue-in-cheek spoof of space opera by George O. Smith, an Astounding regular, perhaps best known for *Venus Equilateral,* who has continued to contribute to Analog off and on through the years. Scholar's Cluster, the place, is a star cluster containing a natural catalyst for mental activity. Humans—and dogs and cats—go there for intellectual stimulation and growth. But they're only allowed to stay so long, and there's some suspicion about the reason for this restriction.

Several years ago there was a wave of popular concern about pollution, in response to which Wallace West, another science fiction old-timer, did a piece for Analog on steam cars as a possible partial solution to the problem. The anti-pollution fad passed and a steam car revival never materialized. Now the problem of the day is energy, and Mr. West returns next month to consider whether steamers might help with that, too.

And then we have the conclusion of Bob Buckley's novel *World in the Clouds,* plus as diverse a collection of short stories and features as we can squeeze in.

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traordinary. They are, believe me, they are. Crystal-matrix cores, lasergrid data retrieval, and other—other features."

"Are you telling us that the *Nightflyer* is an Artificial Intelligence?"

"No," Royd said, "not as I understand it. But it is something close. Mother had a capacity for personality impress built in. She filled the central crystal with her own memories, desires, quirks, her loves and her—hates. That was why she trusted the computer with my education, you see? She knew it would raise me as she herself would, had she the patience. She programmed it in certain other ways as well."

"And you cannot deprogram, my friend?" Karoly asked.

Royd's voice was despairing. "I have *tried*, Karoly. But I am a weak hand at systems work, and the programs are very complicated, the machines very sophisticated. At least three times I have eradicated her, only to have her surface once again. She is a phantom program, and I cannot track her. She comes and goes as she will. A ghost, do you see? Her memories and her personality are so intertwined with the programs that run the *Nightflyer* that I cannot get rid of her without wiping the entire system. But that would leave me helpless. I could never reprogram, and with the computers down the entire ship would fail, drives, life support, everything. I would have to leave the *Nightflyer,* and that would kill me."

"You should have told us, my friend," Karoly d'Branin said. "On Avalon, we have many cyberneticists, some very great minds. We might have aided you. We could have provided expert help."

"Karoly, I have *had* expert help. Twice I have brought systems specialists on board. The first one told me what I have just told you; that it was impossible without wiping the programs completely. The second had trained on Newholme. She thought she could help me. Mother killed her."

"You are still omitting something," Melantha Jhirl said. "I understand how your cybernetic ghost can open and close airlocks at will and arrange other accidents of that nature. But that first death, our telepath, how do you explain that?"

"Ultimately I must bear the guilt," Royd replied. "My loneliness led me to a grievous error. I thought I could safeguard you, even with a telepath among you. I have carried other riders safely. I watch them constantly, warn them away from dangerous acts. If Mother attempts to interfere, I countermand her directly from the control room. That usually works. Not always. Usually. Before you she had killed only five times, and the first three died when I was quite young. That was how I learned about her. That party included a telepath too.

"I should have known better, Karoly. My hunger for life has doomed you all to death. I overestimated my own abilities, and underestimated her fear of exposure. She strikes out when she is threatened, and telepaths are always a threat. They sense her, you see. A

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malign, looming presence, they tell me, something cool and hostile and inhuman."

"Yes," Karoly d'Branin said, "yes, that was what he said. An alien, he was certain of it."

"No doubt she feels alien to a telepath used to the familiar contours of organic minds. Hers is not a human brain, after all. What it is I cannot say—a complex of crystalline memories, a hellish network of interlocking programs, a meld of circuitry and spirit. Yes, I can understand why she might feel alien."

"You still haven't explained how a computer program could explode a man's skull," Melantha said patiently.

"Have you ever held a whisperjewel?" Royd Eris asked her.

"Yes," she replied. She had even owned one once; a dark blue crystal, packed with the memories of a particularly satisfying bout of lovemaking. It had been esper-etched on Avalon, her feelings impressed onto the jewel, and for more than a year she had only to touch it to grow randy. It had finally faded, though, and afterwards she had lost it.

"Then you know that psionic power can be stored," Royd said. "The central core of my computer system is resonant crystal. I think Mother impressed it as she lay dying."

"Only an esper can etch a whisperjewel," Melantha said.

"You never asked me the *why* of it, Karoly," Royd said. "Nor you, Melantha. You never asked why Mother hated people so. She was born gifted, you see. On Avalon, she might have been a class one, tested and trained and honored, her talent nurtured and rewarded. I think she might have been very famous. She might have been stronger than a class one, but perhaps it is only after death that she acquired such power, linked as she is to the *Nightflyer*.

"The point is moot. She was not born on Avalon. On her birth world, her ability was seen as a curse, something alien and fearful. So they cured her of it. They used drugs and electroshock and hypnotraining that made her violently ill whenever she tried to use her talent. She never lost her power, of course, only the ability to use it effectively, to control it with her conscious mind. It remained part of her, suppressed, erratic, a source of shame and pain. And half a decade of institutional cure almost drove her insane. No wonder she hated people."

"What was her talent? Telepathy?"

"No. Oh, some rudimentary ability perhaps. I have read that all psi talents have several latent abilities in addition to their one developed strength. But Mother could not read minds. She had some empathy, although her cure had twisted it curiously, so that the emotions she felt literally sickened her. But her major strength, the talent they took five years to shatter and destroy, was teke."

Melantha Jhirl swore. "No wonder she hated gravity. Telekinesis under weightlessness is—"

"Yes," Royd finished. "Keeping the *Nightflyer* under gravity tortures me,

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but it limits Mother."

In the silence that followed that comment, each of them looked down the dark cylinder of the driveroom. Karoly d'Branin moved awkwardly on his sled. "They have not returned," he said finally.

"They are probably dead," Royd said dispassionately.

"What will we do, friend Royd? We must plan. We cannot wait here indefinitely."

"The first question is what can *I* do," Royd Eris replied. "I have talked freely, you'll note. You deserved to know. We have passed the point where ignorance was a protection. Obviously things have gone too far. There have been too many deaths and you have been witness to all of them. Mother cannot allow you to return to Avalon alive."

"Ah," said Melantha, "true. But what shall she do with *you*? Is your own status in doubt, Captain?"

"The crux of the problem," Royd admitted. "You are still three moves ahead, Melantha. I wonder if it will suffice. Your opponent is four ahead this game, and most of your pawns are already captured. I fear checkmate is imminent."

"Unless I can persuade my opponent's king to desert, no?"

She could see Royd smile at her wanly. "She would probably kill me too if I choose to side with you."

Karoly d'Branin was slow to grasp the point. "But—but what else could you—"

"My sled has a laser. Yours do not. I could kill you both, right now, and thereby earn my way into the *Nightflyer's* good graces."

Across the three meters that lay between their sleds, Melantha's eyes met Royd's. Her hands rested easily on the thruster controls. "You could try, Captain. Remember, the improved model isn't easy to kill."

"I would not kill you, Melantha Jhirl," Royd said seriously. "I have lived sixty-eight standard years and I have never lived at all. I am tired, and you tell grand gorgeous lies. If we lose, we will all die together. If we win, well, I shall die anyway, when they destroy the *Nightflyer*—either that or live as a freak in an orbital hospital, and I would prefer death—"

"We will build you a new ship, Captain," Melantha said.

"Liar," Royd replied. But his tone was cheerful. "No matter. I have not had much a life anyway. Death does not frighten me. If we win, you must tell me about your *volcryn* once again, Karoly. And you, Melantha, you must play chess with me once more, and . . . ." His voice trailed off.

"And sex with you?" she finished, smiling.

"If you would," he said quietly. "I have never—*touched,* you know. Mother died before I was born." He shrugged. "Well, Mother has heard all of this. Doubtless she will listen carefully to any plans we might make, so there is no sense making them. There is no chance now that the control lock will admit me, since it is keyed directly into the ship's computer. So we must

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follow your colleagues through the driveroom, and enter through the manual lock, and take what chances we are given. If I can reach consoles and restore gravity, perhaps we—"

He was interrupted by a low groan.

For an instant Melantha thought the *Nightflyer* was wailing at them again, and she was surprised that it was so stupid as to try the same tactic twice. Then the groan sounded a second time, and in the back of Karoly d'Branin's sled the forgotten fourth survivor struggled against the bonds that held her down. D'Branin hastened to free her, and the psipsych tried to rise to her feet and almost floated off the sled, until he caught her hand and pulled her back. "Are you well?" he asked. "Can you hear me? Have you pain?"

Imprisoned beneath a transparent faceplate, wide frightened eyes flicked rapidly from Karoly to Melantha to Royd, and then to the broken *Nightflyer*. Melantha wondered whether the woman was insane, and started to caution d'Branin, when the psipsych spoke suddenly.

"The *volcryn*," was all she said, "the *volcryn*. Oh, oh, the *volcryn*!"

Around the mouth of the driveroom, the ring of nuclear engines took on a faint glow. Melantha Jhirl heard Royd suck in his breath sharply. She gave the thruster controls of her sled a violent twist. "Hurry," she said, "the *Nightflyer* is preparing to move."

A third of the way down the long barrel of the driveroom, Royd pulled abreast of her, stiff and menacing in his black, bulky armor. Side by side they sailed past the cylindrical stardrives and the cyberwebs; ahead, dimly lit, was the main airlock and its ghastly sentinel.

"When we reach the lock, jump over to my sled," Royd said. "I want to stay armed and mounted, and the chamber is not large enough for two sleds."

Melantha Jhirl risked a quick glance behind her. "Karoly," she called. "Where are you?"

"I am outside, Melantha," the answer came. "I cannot come, my friend. Forgive me."

"But we have to stay together," she said.

"No," d'Branin's voice replied, "no, I could not risk it, not when we are so close. It would be so tragic, so futile, Melantha, to come so close and fail. Death I do not mind, but I must see them first, finally, after all these years." His voice was firm and calm.

Royd Eris cut in. "Karoly, my mother is going to move the ship. Don't you understand? You will be left behind, lost."

"I will wait," d'Branin replied. "My *volcryn* are coming, and I will wait for them."

Then there was no more time for conversation, for the airlock was almost upon them. Both sleds slowed and stopped, and Royd Eris reached out and began the cycle while Melantha moved to the rear of the huge oval worksled. When the outer door moved aside, they glided through into the lock chamber.

"When the inner door opens, it will

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begin," Royd told her evenly. "Most of the permanent furnishings are either built in or welded or bolted into place, but the things that your team brought on board are not. Mother will use those things as weapons. And beware of doors, airlocks, any equipment tied in to the *Nightflyer's* computer. Need I warn you not to unseal your suit?"

"Hardly," she replied.

Royd lowered the sled a little, and its grapplers made a metallic sound as they touched against the chamber floor.

The inner door opened, and Royd applied his thrusters.

Inside the linguists were waiting, swimming in a haze of blood. The man had been slit from crotch to throat and his intestines moved like a nest of pale, angry snakes. The woman still held the knife. They swam closer with a grace they had never possessed in life.

Royd lifted his foremost grapplers and smashed them to the side. The man caromed off a bulkhead, leaving a wide wet mark where he struck, and more of his guts came sliding out. The woman lost control of the knife. Royd accelerated past them, driving up the corridor, through the cloud of blood.

"I'll watch behind," Melantha said, and she turned and put her back to his. Already the two corpses were safely behind them. The knife was floating uselessly in the air. She started to tell Royd that they were all right when the blade abruptly shifted and came after them, as if some invisible force had taken hold of it.

"*Swerve*!" she shouted.

The sled shot wildly to one side. The knife missed by a full meter, and glanced ringingly off a bulkhead.

But it did not drop. It came at them again.

The lounge loomed ahead. Dark.

"The door is too narrow," Royd said. "We will have to abandon the sled, Melantha." Even as he spoke, they hit: he wedged the sled squarely into the doorframe, and the sudden impact jarred them loose.

For a moment Melantha floated clumsily in the corridor, trying to get her balance. The knife slashed at her, opening her suit and her shoulder. She felt sharp pain and the warm flush of bleeding "*Damn*," she shrieked. The knife came around again, spraying droplets of blood.

Melantha's hand darted out and caught it.

She muttered something under her breath, and wrenched the blade free of the force that had been gripping it.

Royd had regained the controls of his sled and seemed intent on some manipulation. Beyond, in the dimness of the lounge, Melantha saw a dark semi-human shape float into view.

"*Royd*!" she warned, but as she did the thing activated its laser. The pencil beam caught Royd square in the chest.

He touched his own firing stud. The sled's heavy-duty laser cindered the xenobiologist's weapon and burned off his right arm and part of his chest. Its pulsing shaft hung in the air, and smoked against the far bulkhead.

Royd made some adjustments and began cutting a hole. "We'll be through in five minutes or less," he said curtly,

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without stopping or looking up.

"Are you all right?" Melantha asked.

"I'm uninjured," he replied. "My suit is better armored than yours, and his laser was a low-powered toy."

Melantha turned her attention back to the corridor.

The linguists were pulling themselves toward her, one on each side of the passage, to come at her from two directions at once. She flexed her muscles. Her shoulder throbbed where she had been cut. Otherwise she felt strong, almost reckless. "The corpses are coming after us again," she told Royd. "I'm going to take them."

"Is that wise?" he asked. "There are two of them."

"I'm an improved model," Melantha said, "and they're dead." She kicked herself free of the sled and sailed toward the man. He raised his hands to block her. She slapped them aside, bent one arm back and heard it snap, and drove her knife deep into his throat before she realized what a useless gesture that was. The man continued to flail at her. His teeth snapped grotesquely.

Melantha withdrew her blade, seized him, and with all her considerable strength threw him bodily down the corridor. He tumbled, spinning wildly, and vanished into the haze of his own blood.

Melantha then flew in the opposite direction.

The woman's hands went around her from behind.

Nails scrabbled against her faceplate until they began to bleed, leaving red streaks on the plastic.

Melantha spun to face her attacker, grabbed a thrashing arm, and flung the woman down the passageway to crash into her struggling companion.

"I'm through," Royd announced.

She turned to see. A smoking meter-square opening had been cut through one wall of the lounge. Royd killed the laser, gripped both sides of the doorframe, and pushed himself towards it.

A piercing blast of sound drilled through her head. She doubled over in agony. Her tongue flicked out and clicked off the comm; then there was blessed silence.

In the lounge it was raining. Kitchen utensils, glasses and plates, pieces of human bodies all lashed violently across the room, and glanced harmlessly off Royd's armored form. Melantha—eager to follow—drew back helplessly. That rain of death would cut her up to pieces in her lighter, thinner vacuum suit. Royd reached the far wall and vanished into the secret control section of the ship. She was alone.

The *Nightflyer* lurched, and sudden acceleration provided a brief semblance of gravity. She was thrown to one side. Her injured shoulder smashed painfully against the sled.

All up and down the corridor doors were opening.

The linguists were moving toward her once again.

The *Nightflyer* was a distant star sparked by its nuclear engines. Blackness and cold enveloped them, and

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below was the unending emptiness of the Tempter's Veil, but Karoly d'Branin did not feel afraid. He felt strangely transformed.

The void was alive with promise.

"They *are* coming," he whispered. "Even I, who have no psi at all, even I can feel it. The Crey story must be so, even from light-years off they can be sensed. Marvelous!"

The psipsych seemed very small. "The *volcryn*," she muttered. "What good can they do us. I hurt. The ship is gone. D'Branin, my head aches." She made a small frightened noise. "The boy said that, just after I injected him, before...before...you know. He said that his head hurt."

"Quiet, my friend. Do not be afraid. I am here with you. Wait. Think only of what we shall witness, think only of that!"

"I can sense them," the psipsych said.

D'Branin was eager. "Tell me, then. We have the sled. We shall go to them. Direct me."

"Yes," she agreed. "Yes. Oh, yes."

Gravity returned: in a flicker, the universe became almost normal.

Melantha fell to the deck, landed easily and rolled, and was on her feet cat-quick.

The objects that had been floating ominously through the open doors along the corridor all came clattering down.

The blood was transformed from a fine mist to a slick covering on the corridor floor.

The two corpses dropped heavily from the air, and lay still.

Royd spoke to her. His voice came from the communicator grills built into the walls, not over her suit comm. "I made it," he said.

"I noticed," she replied.

"I'm at the main control console," he continued. "I have restored the gravity with a manual override, and I'm cutting off as many computer functions as possible. We're still not safe, though. She will try to find a way around me. I'm countermanding her by sheer force, as it were. I cannot afford to overlook anything, and if my attention should lapse for even a moment...Melantha, was your suit breached?"

"Yes. Cut at the shoulder."

"Change into another one. *Immediately.* I think the counter programming I'm doing will keep the locks sealed, but I can't take any chances."

Melantha was already running down the corridor, towards the cargo hold where the suits and equipment were stored.

"When you have changed," Royd continued, "dump the corpses into the mass conversion unit. You'll find the appropriate hatch near the driveroom, just to the left of the main lock. Convert any other loose objects that are not indispensible as well; scientific instruments, books, tapes, tableware—"

"Knives," suggested Melantha.

"By all means."

"Is teke still a threat, Captain?"

"Mother is vastly weaker in a gravity field," Royd said. "She has to fight it.

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Even boosted by the *Nightflyer's* power, she can only move one object at a time, and she has only a fraction of the lifting force she wields under weightless conditions. But the power is still there, remember. Also, it is possible she will find a way to circumvent me and cut out the gravity again. From here I can restore it in an instant, but I don't want any weapons lying around even for that brief period of time."

Melantha had reached the cargo area. She stripped off her vacuum suit and slipped into another one in record time. Then she gathered up the discarded suit and a double armful of instruments and dumped them into the conversion chamber. Afterwards she turned her attention to the bodies. The man was no problem. The woman crawled down the hall after her as she pushed him through, and thrashed weakly when it was her own turn, a grim reminder that the *Nightflyer's* powers were not all gone. Melantha easily overcame her feeble struggles and forced her through.

The corpse of the xenobiologist was less trouble, but while she was cleaning out the lounge a kitchen knife came spinning at her head. It came slowly, though, and Melantha just batted it aside, then picked it up and added it to the pile for conversion.

She was working through the second cabin, carrying the psipsych's abandoned drugs and injection gun under her arm, when she heard Royd cry out.

A moment later, a force like a giant invisible hand wrapped itself around her chest and squeezed and pulled her, struggling, to the floor.

Something was moving across the stars.

Dimly and far off, d'Branin could see it, though he could not yet make out details. But it was there, that was unmistakable, some vast shape that blocked off a section of the starscape. It was coming at them dead on.

How he wished he had his team with him now, his telepath, his experts, his instruments.

He pressed harder on the thrusters.

Pinned to the floor, hurting, Melantha Jhirl risked opening her suit's comm. She had to talk to Royd. "Are you there?" she asked. "What's happening?" The pressure was awful, and it was growing steadily worse. She could barely move.

The answer was pained and slow in responding. "...outwitted...me," Royd's voice managed. "...hurts... to...talk."

"Royd—"

"...she...teked...dial...up... two...gees...three...higher...right ...here...on...the...board...all ...I...have to...to do...turn it ...back...back...let me..."

Silence. Then, finally, when Melantha was near despair, Royd's voice again. One word: "...can't..."

Melantha's chest felt as if it were supporting ten times her own weight. She could imagine the agony Royd must be in; Royd, for whom even one gravity was painful and dangerous. Even if the dial was an arm's length

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away, she knew his feeble musculature would never let him reach it. "Why," she started, having somewhat less trouble talking than Royd, "why would she turn *up* the...gravity...it... weakens her too, yes?"

". . . yes . . . but . . . in a . . . a time . . . hour . . . minute . . . my . . . my heart . . . will burst . . . and . . . and then . . . you alone . . . she . . . will . . . kill gravity . . . kill you . . ."

Painfully, Melantha reached out her arm and dragged herself half a length down the corridor. "Royd . . . hold on . . . I'm coming . . ." She dragged herself forward again. The psipsych's drug kit was still under her arm, impossibly heavy. She eased it down and started to shove it aside, then reconsidered. Instead she opened its lid.

The ampules were all neatly labeled. She glanced over them quickly, searching for adrenaline or synthastim, anything that might give her the strength she needed to reach Royd. She found several stimulants, selected the strongest, and was loading it into the injection gun with awkward, agonized slowness when her eyes chanced on the supply of esperon.

Melantha did not know why she hesitated. Esperon was only one of a half-dozen psionic drugs in the kit, but something about seeing it bothered her, reminded her of something she could not quite lay her finger on. She was trying to sort it out when she heard the noise.

"Royd," she said, "your mother . . . could she move . . . she couldn't move anything . . . teke it . . . in this high a gravity . . . could she?"

"Maybe," he answered, ". . . if . . . concentrate . . . all her . . . power . . . hard . . . maybe possible . . . why?"

"Because," Melantha Jhirl said grimly, "because something . . . some*one* . . . is cycling through the airlock."

The *volcryn* ship filled the universe.

"It is not truly a ship, not as I thought it would be," Karoly d'Branin was saying. His suit, Academy-designed, had a built-in encoding device, and he was recording his comments for posterity, strangely secure in the certainty of his impending death. "The scale of it is difficult to imagine, difficult to estimate. Vast, vast. I have nothing but my wrist computer, no instruments, I cannot make accurate measurements, but I would say, oh, a hundred kilometers, perhaps as much as three hundred, across. Not solid mass, of course, not at all. It is delicate, airy, no ship as we know ships. It is—oh, beautiful—it is crystal and gossamer, alive with its own dim lights, a vast intricate kind of spiderwebby craft—it reminds me a bit of the old starsail ships they used once, in the days before drive, but this great construct, it is not solid, it cannot be driven by light. It is no ship at all, really. It is all open to vacuum, it has no sealed cabins or life-support spheres, none visible to me, unless blocked from my line of sight in some fashion, and no, I cannot believe that, it is too open, too

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fragile. It moves quite rapidly. I would wish for the instrumentation to measure its speed, but it is enough to be here. I am taking our sled at right angles to it, to get clear of its path, but I cannot say that I will make it. It moves so much faster than we. Not at light speed, no, far below it, but still faster than the *Nightflyer* and its nuclear engines, I would guess. Only a guess.

"The *volcryn* craft has no visible means of propulsion. In fact, I wonder how—perhaps it *is* a light-sail, laser-launched millennia ago, now torn and rotted by some unimaginable catastrophe—but no, it is too symmetrical, too beautiful, the webbings, the great shimmering veils near the nexus, the beauty of it.

"I must describe it, I must be more accurate, I know. It is difficult, I grow too excited. It is large, as I have said, kilometers across. Roughly—let me count—yes, roughly octagonal in shape. The nexus, the center, is a bright area, a small darkness surrounded by a much greater area of light, but only the dark portion seems entirely solid—the lighted areas are translucent, I can see stars through them, though discolored, shifted towards the purple. Veils, I call those the veils. From the nexus and the veils eight long—oh, vastly long—spurs project, not quite spaced evenly, so it is not a true geometric octagon—ah, I see better now, one of the spurs is shifted, oh, very slowly, the veils are rippling—they are mobile then, those projections, and the webbing runs from one spur to the next, around and around, but there are—patterns, odd patterns, it is not at all the simple webbing of a spider. I cannot quite see order in the patterns, in the traceries of the webs, but I feel sure that the order is there, the meaning is waiting to be found.

"There are lights. Have I mentioned the lights? The lights are brightest around the center nexus, but they are nowhere very bright, a dim violet. Some visible radiation, then, but not much. I would like to take an ultraviolet reading of this craft, but I do not have the instrumentation. The lights move. The veils seem to ripple, and lights run constantly up and down the length of the spurs, at differing rates of speed, and sometimes other lights can be seen traversing the webbing, moving across the patterns. I do not know what the lights are or whether they emanate from inside the craft or outside.

"The *volcryn* myths, this is really not much like the legends, not truly. Though, as I think, now I recall a Nor T'alush report that the *volcryn* ships were impossibly large, but I took that for exaggeration. And lights, the *volcryn* have often been linked to lights, but those reports were so vague, they might have meant anything, described anything from a laser propulsion system to simple exterior lighting, I could not know it meant this. Ah, what mysteries! The ship is still too far away for me to see the finer detail. I think perhaps the darker area in the center *is* a craft, a life capsule. The *volcryn* must be inside it. I wish my team was with me, my telepath. He was a class one, we might have made con-

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tact, might have communicated with them. The things we would learn! The things they have seen! To think how old this craft is, how ancient this race, how long they have been outbound! It fills me with awe. Communication would be such a gift, such an impossible gift, but they are so alien."

"*D'Branin,*" the psipsych said in a low, urgent voice. "Can't you feel?"

Karoly d'Branin looked at his companion as if seeing her for the first time. "Can *you* feel them? You are a three, can you sense them now, strongly?"

"Long ago," the psipsych said. "Long ago."

"Can you project? Talk to them. Where are they? In the center area?"

"Yes," she replied, and she laughed. Her laugh was shrill and hysterical, and d'Branin had to recall that she was a very sick woman. "Yes, in the center, d'Branin, that's where the pulses come from. Only you're wrong about them. It's not a *them* at all, your legends are all lies, lies, I wouldn't be surprised if we were the first to ever see your *volcryn,* to ever come this close. The others, those aliens of yours, they merely *felt,* deep and distantly, sensed a bit of the nature of the *volcryn* in their dreams and visions, and fashioned the rest to suit themselves. Ships, and wars, and a race of eternal travellers, it is all —all—"

"What do you mean, my friend?" Karoly said, baffled. "You do not make sense. I do not understand."

"No," the psipsych said, her voice suddenly gentle. "You do not, do you? You cannot feel it, as I can. So clear now. This must be how a one feels, all the time. A one full of esperon."

"*What* do you feel? *What*?"

"It's not a *them,* Karoly," the psipsych said. "It's an *it.* Alive, Karoly, and quite mindless, I assure you."

"Mindless?" d'Branin said. "No, you must be wrong, you are not reading correctly. I will accept that it is a single creature if you say so, a single great marvelous star-traveller, but how can it be mindless? You sensed it, its mind, its telepathic emanations. You and the whole of the Crey sensitives and all the others. Perhaps its thoughts are too alien for you to read."

"Perhaps," the psipsych admitted, "but what I do read is not so terribly alien at all. Only animal. Its thoughts are slow and dark and strange, hardly thoughts at all, faint. The brain must be huge, I grant you that, but it can't be devoted to conscious thought."

"What do you mean?"

"The propulsion system, d'Branin. Don't you *feel*? The pulses? They are threatening to rip off the top of my skull. Can't you guess what is driving your damned *volcryn* across the galaxy? Why they avoid gravity wells? Can't you guess how it is moving?"

"No," d'Branin said, but even as he denied it a dawn of comprehension broke across his face, and he looked away from his companion, back at the swelling immensity of the *volcryn,* its lights moving, its veils a-ripple, as it came on and on, across light-years, light-centuries, across eons.

When he looked back to her, he mouthed only a single word: "Teke,"

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he said. Silence filled their world.

She nodded.

Melantha Jhirl struggled to lift the injection gun and press it against an artery. It gave a single loud hiss, and the drug flooded her system. She lay back and gathered her strength, tried to think. Esperon, esperon, why was that important? It had killed the telepath, made him a victim of his own abilities, tripled his power and his vulnerability. Psi. It all came back to psi.

The inner door of the airlock opened. The headless corpse came through.

It moved with jerks, unnatural shuffings, never lifting its legs from the floor. It sagged as it moved, half-crushed by the weight upon it. Each shuffle was crude and sudden; some grim force was literally yanking one leg forward, then the next. It moved in slow motion, arms stiff by its sides.

But it moved.

Melantha summoned her own reserves and began to crawl away from it, never taking her eyes off its advance.

Her thoughts went round and round, searching for the piece out of place, the solution to the chess problem, finding nothing.

The corpse was moving faster than she was. Clearly, visibly, it was gaining.

Melantha tried to stand. She got to her knees, her heart pounding. Then one knee. She tried to force herself up, to lift the impossible burden on her shoulders. She was strong, she told herself. She was the improved model.

But when she put all her weight on one leg, her muscles would not hold her. She collapsed, awkwardly, and when she smashed against the floor it was as if she had fallen from a building. She heard a sharp *snap,* and a stab of agony flashed up the arm she had tried to use to break her fall. She blinked back tears and choked on her own scream.

The corpse was halfway up the corridor. It must be walking on two broken legs, she realized. It didn't care.

"Melantha . . . heard you . . . are . . . you . . . Melantha?"

"*Quiet,*" she snapped at Royd. She had no breath to waste on talk.

Now she had only one arm. She used the disciplines she had taught herself, willed away the pain. She kicked feebly, her boots scraping for purchase, and she pulled herself forward with her good arm.

The corpse came on and on.

She dragged herself across the threshold of the lounge, worming her way under the crashed sled, hoping it would delay the cadaver.

It was a meter behind her.

In the darkness, in the lounge, there where it had all begun, Melantha Jhirl ran out of strength.

Her body shuddered, and she collapsed on the damp carpet, and she knew that she could go no further.

On the far side of the door, the corpse stood stiffly. The sled began to shake. Then, with the scrape of metal against metal, it slid backwards, moving in tiny sudden increments, jerking itself free and out of the way.

Psi. Melantha wanted to curse it, and cry. Vainly she wished for a psi

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power of her own, a weapon to blast apart the teke-driven corpse that stalked her. She was improved, she thought angrily, but not improved enough. Her parents had given her all the genetic gifts they could arrange, but psi was beyond them. The gene was astronomically rare, recessive, and—

—and suddenly it came to her.

"*Royd*!" she yelled, put all of her remaining will into her words. "The dial... *teke it.* Royd, teke it!"

His reply was very faint, troubled. "...can't...I don't...Mother... only...her...not me...no..."

"Not mother," she said, desperate. "You always...say...*mother*. I forgot...forgot. Not your mother... listen...you're a *clone*...same genes...you have it, too. The power."

"Don't," he said. "Never...must be...sex-linked."

"*No*! It *isn't*. I know... Promethean, Royd...don't tell a Promethean...about genes...turn it!"

The sled jumped a third of a meter, and listed to the side. A path was clear.

The corpse came forward.

"...trying," Royd said. "Nothing ...I *can't!*"

"She *cured* you," Melantha said bitterly. "Better than...she was... cured...pre-natal...but it's only... suppressed...you *can*!"

"I...don't...know... how."

The corpse now stood above her. Stopped. Pale-fleshed hands trembled spasticly. Began to rise.

Melantha swore, and wept, and made a futile fist.

And all at once the gravity was gone. Far, far away, she heard Royd cry out and then fall silent.

The corpse bobbed awkwardly into the air, its hands hanging limply before it. Melantha, reeling in the weightlessness, tried to ready herself for its furious assault.

But the body did not move again. It floated dead and still. Melantha moved to it, pushed it, and it sailed across the room.

"Royd?" she said uncertainly.

There was no answer.

She pulled herself through the hole into the control chamber.

And found Royd Eris, master of the *Nightflyer,* prone on his back in his armored suit, dead. His heart had given out.

But the dial on the gravity grid was set at zero.

I have held the *Nightflyer's* crystalline soul within my hands.

It is deep and red and multifaceted, large as my head, and icy to the touch. In its scarlet depths, two small sparks of light burn fiercely and sometimes seem to whirl.

I have crawled through the consoles, wound my way carefully past safeguards and cybernets, taking care to damage nothing, and I have laid rough hands on that great crystal, knowing that it is where *she* lives.

And I cannot bring myself to wipe it.

Royd's ghost has asked me not to.

Last night we talked about it once again, over brandy and chess in the lounge. Royd cannot drink, of course, but he sends his spectre to smile at me,

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and he tells me where he wants his pieces moved.

For the thousandth time he offered to take me back to Avalon, or any world of my choice, if only I would go outside and complete the repairs we abandoned so many years ago, so that the *Nightflyer* might safely slip into stardrive.

For the thousandth time I refused.

He is stronger now, no doubt. Their genes are the same, after all. Their power is the same. Dying, he too found the strength to impress himself upon the great crystal. The ship is alive with both of them, and frequently they fight. Sometimes she outwits him for a moment, and the *Nightflyer* does odd, erratic things. The gravity goes up or down or off completely. Blankets wrap themselves around my throat when I sleep. Objects come hurtling out of dark corners.

Those times have come less frequently of late, though. When they do come, Royd stops her, or I do. Together, the *Nightflyer* is ours.

Royd claims he is strong enough alone, that he does not really need me, that he can keep her under check. I wonder. Over the chessboard, I still beat him nine games out of ten.

And there are other considerations. Our work, for one. Karoly would be proud of us.

The *volcryn* will soon enter the mists of the Tempter's Veil, and we follow close behind. Studying, recording, doing all that old d'Branin would have wanted us to do. It is all in the computer. It is also on tape and on paper, should the computer ever be wiped. It will be interesting to see how the *volcryn* thrives in the Veil. Matter is so thick there, compared to the thin diet of interstellar hydrogen on which the creature has fed for endless eons.

We have tried to communicate with it, with no success. I do not believe it is sentient at all.

And lately Royd has tried to imitate its ways, gathering all his energies in an attempt to move the *Nightflyer* by teke. Sometimes, oddly, his mother even joins him in those efforts. So far they have failed, but we will keep trying.

So the work goes on, and it *is* important work, though not the field I trained for, back on Avalon. We know that our results will reach humanity. Royd and I have discussed it. Before I die, I will destroy the central crystal and clear the computers, and afterwards I will set course manually for the close vicinity of an inhabited world. I know I can do it. I have all the time I need, and I am an improved model.

I will not consider the other option, though it means much to me that Royd suggests it again and again. No doubt I could finish the repairs. Perhaps Royd could control the ship without me, and continue the work. But that is not important.

When I finally touched him, for the first and last and only time, his body was still warm. But *he* was gone already. He never felt my touch. I could not keep that promise.

But I can keep my other.

I will not leave him alone with her.

Ever. ■

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● Life on a neutron star? Far out, yes—but a real and fascinating possibility, solidly rooted in today's physics.

COMPU-NEWS TIME: 08:26:21 Thursday 2 March 2056
COMPU-AD (USE CONTROL-P TO SKIP TO NEXT ITEM IN YOUR MORNING COMPU-NEWS)

The world is still reacting to the emotional shock of its encounter with a superior race—the Cheela. Unique, fascinating, miniscule—masters of space and time—yet when we first contacted them six years ago, they were still savages.

Read more about the Cheela—our former students, and now our friends and mentors—in the newly revised 2056 electronic edition of Del Rey's Science Encyclopedia, published simultaneously by Random House Interplanetary, New York, Earth, and Washington, Mars. Here are a few selected sections from that comprehensive and indispensable work that should be in everyone's personal computer data bank.

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DRAGON'S EGG

Dragon's Egg is a nearby neutron star. It has a mass one-half that of the sun but a diameter of only 20 kilometers. It is spinning at 5.0183495 rps, has a gravitational field at its surface of 67 *billion* gees, and a trillion gauss magnetic field. The center of Dragon's Egg has a liquid core 7 kilometers in radius containing superfluid neutrons, a small quantity of superfluid protons, and enough normal fluid electrons to balance the charge on the protons. At the very center of the star, where the densities and pressures are highest, there are various exotic elementary particles mixed in with the neutrons.

Over this core of liquid neutrons is a 2 kilometer thick mantle of crystalline neutrons and nuclei. The crystalline crust varies from pure neutrons near the liquid core to nearly all nuclei near the top of the mantle. The outer crust of the star consists of neutron-rich metal nuclei (mostly iron) with a density near the surface of about 7 million grams per cubic centimeter.

The crust and mantle are solid structures over a liquid core. As the star cools and shrinks, the crust cracks and thrusts up mountain ranges. The mountains range in height from a few millimeters to as much as 10 centimeters high. The higher mountain ranges will poke up out of the predominantly iron-vapor atmosphere.

The large Mount Exodus volcano in the northern hemisphere of

Adapted from the Technical Appendix to the forthcoming novel *Dragon's Egg*. Copyright ©1980 by Dr. Robert L. Forward, to be published in hardcover by Del Rey Books.

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A TASTE OF DRAGON'S EGG

DR. ROBERT L. FORWARD

Dragon's Egg is a volcano that was formed over a deep crack in the crust of the star. The liquid material at the lower depths rises through the fissure to form the volcanic shield. Volcanos such as Mount Exodus can build up lava shields many centimeters in height and hundreds of meters in diameter, and will finally be the cause of starquakes.

Starquakes involve the drop of a lava shield or mountain range by a few millimeters in the 67 billion gee gravity field of the star. Starquakes on several neutron stars have been detected by radio telescopes on the Earth observing a slight increase in the period of the radio pulses coming from the magnetic poles of the rapidly spinning stars. The decrease in inertia of the star from the lowering of the mountain range causes the spin speed of the star to increase.

Dragon's Egg was the product of a supernova explosion that occurred about 500,000 years ago at a distance of 50 light-years from the solar system. In the process of formation, the neutron star/pulsar acquired a significant proper velocity of 30 kilometers per second (one light-year in 10,000 years or 6 AU in one year).

At the time of its discovery in 2020, Dragon's Egg was at a distance of 2300 AU from Earth. When the humans finally arrived at the star thirty years later in 2050, the distance had narrowed to 2120 AU. At the time of this edition (2056) the star is at a distance of about 2080 AU. It will reach its point of closest approach of 250 AU in about 300 years, then recede again. Some perturbation of the outer planets is expected, but there should be no significant effects on the orbit of Earth.

Dragon's Egg was given its name by the Chinese astronomer S-Y Wang. He found the position of Dragon's Egg in the night sky to be at almost the same declination (+70 degrees) and right ascension (11.5 hours) as Giansar, the bright star at the end of the constellation Draco (The Dragon), as if it were a recently laid egg of the Dragon constellation.

CHEELA PHYSIOLOGY

By the time the humans discovered Dragon's Egg, life forms had evolved on the neutron star. (Amazingly enough, the possibility of the existence of life on a neutron star was predicted almost a century ago in 1973 by the radio astronomer Frank Drake.) The very first forms of life on Dragon's Egg were plants, which lived

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by running a heat cycle between the hot crust and the cold of the sky. These plants later evolved into mobile animal forms.

The dominant animal life forms on the star are called Cheela. Since they are intelligent, they have roughly the same complexity as humans. That implies that they have the same number of nuclei, so it is not surprising that they weigh about the same as humans—70 kilograms. The Cheela are flat, amoeba type creatures about 2.5 millimeters in radius (0.5 centimeters in diameter), and 0.5 millimeters high, with a density of 7 million grams per cubic centimeter.

The atomic nuclei that make up the Cheela do not have captive electron clouds to keep them isolated from each other, but instead share a "sea" of free electrons. Because of the resulting close proximity of the nuclei, it is as easy for Cheela nuclei to exchange neutrons as it is for human atoms to exchange electrons. The nuclei couple into "nuclear bonded molecules" by neutron exchange. Since the Cheela use nuclear coupling instead of molecular coupling in their bodies, their rate of living is about one million times that of human beings.

Cheela can form crystalline "bones" when needed, but normally keep a more flexible structure and can flow around and into instruments to operate them. Because of the high gravitational field, Cheela do not have strength to extend themselves more than a few millimeters above the crust. Their psychology with respect to gravity, height and things-over-your-head is identical to that of the fictional alien beings called Mesklinites found in the ancient science fiction stories by author Hal Clement.

The magnetic field on Dragon's Egg dominates everything. The velocity of sound, the opacity of the atmosphere, the force it takes to move, the flow of lava and landslides, the pressure of the atmosphere, and many other things, vary by ratios of 10:1 from a direction along the magnetic field to a direction transverse to the field. The structure of the crustal surface consists of close-packed, dense "hairs" aligned along the magnetic field. These are horizontal along the magnetic equator and vertical at the magnetic poles.

It is easier for things to move along the magnetic field lines than transverse to them. But this also means that energy can be extracted by loss mechanisms for motion along the field lines, whereas transverse to the field lines, there is little motion due to the rigidity, so there are few losses. Since the electromagnetic fields in light are transverse to the direction of propagation, it is easier to see *along* the magnetic field lines.

Even the nuclei in the bodies of the Cheela have their aspect ratio changed as much as 10:1 in the direction of the magnetic field since it is easier for the protons in the nuclei to move in the direction of the magnetic field

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than across it. Thus, a Cheela at the magnetic pole will be 10 times taller than one at the equator, and one at the equator will be 10 times wider toward the magnetic poles than transverse. Because of this variability, the concept of "length" was slow to develop in the Cheela sciences. Even the Cheela measuring sticks vary, and if they make surveys, they will find that according to the number of measuring sticks needed to count off a distance on the star, their home is "flattened" 10:1 near the magnetic poles.

The Cheela communicate by strumming the crust with their lower surfaces (tread) to produce directed vibrations in the neutron star crust. The strong magnetic fields polarize the surface material and since the crust has a nuclei lattice and an electron sea, the Cheela have three modes of talking: long-talk—along the magnetic field using Rayleigh-type compressional waves, short-talk—transverse (shear) waves for communication across the magnetic field lines, and fast-talk—using electromagnetic fields generated by their bodies to excite the electron sea. Since fast-talk travels at the speed of light, it is somewhat faster than the two acoustic waves, but it is more highly attenuated and is used mostly for whispering.

As Pierre Niven, the only human to actually look at a Cheela, said: "A Cheela looks like a miniature scallop out of its shell. It even has a ring of twelve eyes around its periphery like a scallop. A Cheela's eyes, however, are a hot, glowing red, instead of the cool blue of a scallop's eyes."

FIGURE 1. Cheela Squad Leader North-Wind.

A picture of a Cheela is shown in Figure 1. This was drawn from memory by the Leonardo da Vinci of Dragon's Egg, Troop Commander/Astrologer Swift-Killer. She built the first Cheela X-ray generator to send signals up to the humans in orbit. The Trooper in the drawing is Squad Leader North-Wind (identified by his two-button insignia of rank). He is holding a short sword and a Dragon Tooth (although Squad Leaders did not usually carry the long spear). The two puckered sections in his side are closed off carrying pouches or eating orifices. The small seminal fluid ejection holes under each eye stub are the primary sex organs unique to a male Cheela.

A Cheela's eyes are a remarkable

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example of parallel evolution. In structure and function they are close parallels to the bright-blue stalk-supported eyes of the scallop shellfish on Earth. The eyes of the Cheela are about 0.1 millimeters = 100 microns in diameter. To give the eyes adequate resolution, they must use wavelengths of 0.1 microns = 1000 angstroms or smaller. Thus, the normal range of Cheela vision is the ultraviolet region, although they can see down into the X-ray band if there is enough illumination. One Cheela (the Prophet Pink-Eyes), could see up into the violet end of the human visual range. This genetic freak was instrumental in the first contact, since only he could see the laser beams from the human exploration spacecraft that were mapping the surface of the star.

The illumination for seeing comes primarily from the glowing surface of the star. At a temperature of 8200 K the neutron star crust has adequate flux in the long-wavelength part of the Cheela vision band (700-1000 angstroms), but it cuts off at 600 angstroms. Things that are hotter (Cheela bodies at 8500-9000 K, and hot illumination sources from 10,000-50,000 K) not only emit more photons, but their "color" shifts toward "blue," and the resolution goes up. Cooler things, (like the top of a Cheela or a plant) have a shift to longer, "redder" wavelengths.

CHEELA HISTORY

The story of Dragon's Egg and its inhabitants is covered in great detail by Pierre Niven in his bestselling

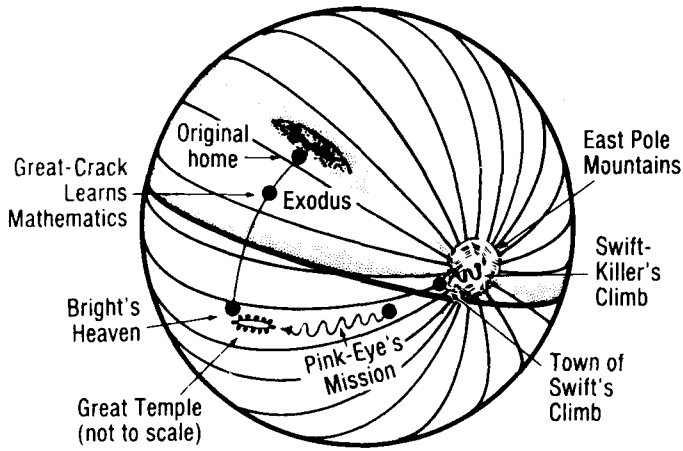

FIGURE 2. Dragon's Egg, showing lines of magnetic longitude and migrations of the developing Cheela.

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book, *My Visit With Our Nucleonic Friends*. This was the only book that won a Nobel, Pulitzer, Hugo, Nebula and Mobius Prize in the same year (2053). Figure 2 is taken from the second volume of this definitive three-volume study/story and illustrates the physical features of the star and the major cultural migrations of the developing Cheela. As is shown in Figure 2, the star has four poles. In addition to the normal north and south spin poles, it has "east" and "west" magnetic poles that lie almost on the equator. The lines drawn from the east magnetic pole in Figure 2 are the lines of magnetic longitude. The actual magnetic field is three dimensional, and extends for some distance out into the region around the star.

According to ancient myths of the Cheela, they are descended from a "chosen clan" that was driven from the northern hemisphere by a hateful Dragon God, who was said to live inside what is now the Mount Exodus volcano. The Dragon God sent blasts of fire, rivers of molten lava, and dense smoke to drive the Cheela southward into a purgatory region where they were forced to travel in the hard direction (across the magnetic field lines), through a "feeling lost" region that was covered with dense smoke.

The Cheela use a combination of magnetic and Coriolis fields for directional homing. In the "feeling lost" region, the lines of magnetic direction are parallel to the lines of rotation, and the Cheela would lose their inherent sense of direction and would feel "lost."

The smoke just above the equator is due to an interaction between the east-west magnetic field and the rotation of the star. The smoke from the volcano travels predominantly along the magnetic field lines until it reaches the east and west poles, where the magnetic field lines dip into the surface. The smoke then leaks out at the magnetic poles and moves again along the magnetic field lines, but now along the equator, driven by the equatorial "trade winds" in the atmosphere. The star thus has a crescent-shaped band of smoke in the magnetic longitude of the volcano, and a circular band just above the spin equator.

The "chosen clan," driven from their original home by the Dragon God, finally moved southward across the spin equator to the southern hemisphere of the star, leaving the purgatory region behind. They found a land of plenty, with many edible plants and animals, but no other Cheela. Their experience would be similar to the first entry of humans into the North American continent. Like the deep water barriers on Earth, the "feeling lost" regions at the spin equator had produced a psychological barrier to the Cheela that had kept the southern hemisphere isolated until then.

In this new land, the "chosen clan" discovered a very bright star sitting just over the south pole. The star was our sun, only 2300 AU (1/30

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of a light-year) away. A monotheistic religion developed based on worship of the God-star Bright. The "chosen clan" grew, and split into many clans, but all clans stayed under the loose rule of a Leader of All Clans.

The development of the Cheela from a nomadic tribe into a great empire that finally established their rule over the entire star is well covered in Niven's book.

RELATIVE TIMES

The relative time scales between the Cheela and humans is still a subject of debate among experts, since the Cheela physiology is so drastically different from human physiology.

The basic unit of time on Dragon's Egg is the revolution rate of the star, which is 5.0183495 rps, or a period of approximately 0.1993 seconds. Some experts have equated one turn of the star with one human day, giving a relative rate of 0.43 million to one. Others point out that since there is no night or day on the neutron star and the Cheela, who never sleep, are active the full turn, the ratio should be closer to a million to one.

The Cheela use a base 12 number system (they have twelve eyes) and their next unit of time after the turn is a great of turns or 144 turns. They occasionally use a dozen turns, but it never had the same significance as the week does to humans. A great of turns is 28.7 seconds, while a human year is 31.6 million seconds. Thus, the ratio of a human year to a Cheela great of turns is 1.1 million to one.

From studying the history of the Cheela we have learned that a Cheela spends about 12 greats (six minutes) as a hatchling, 12 greats as a young apprentice, 30 greats (15 minutes) as a worker, 12 greats as an Old One tending eggs and hatchlings, then the rest of their life (maximum of 24 greats or 12 minutes) as Aged Ones. All indications lead to the conclusion that the effective relative time scale between the Cheela and humans is approximately a million to one.

A human second is equivalent to 5 Cheela "days," while a human minute is equivalent to 2 Cheela "years." One human hour takes 5 Cheela "generations," and one human day encompasses 2.5 Cheela "millennia," enough for the rise and fall of great civilizations.

DRAGON SLAYER

The scientific spacecraft used for the close approach to the neutron star was a seven meter sphere with a spinning tower 1.6 meters in diameter and 2.5 meters tall, containing the microwave sounder, infra-red telescope, laser radar, star image telescope mirror, and other star-oriented instruments. When in synchronous orbit about the star, the science instrument tower on the top of the ship was aligned in the direction of the north spin pole of the neutron star. The bottom end of the science sphere had a viewing port that looked southward toward the distant solar system.

Around the equator of the ship were six viewing ports that looked out at the neutron star whirling about

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the ship. The ship was inertially stabilized, so that the distant stars stayed fixed in the viewing ports. The ship, being in orbit around the neutron star with a period of 0.1993 sec (5.018 rps), rotated with respect to the neutron star at 5 times a second. The science turret was de-spun at the orbital rate so that the instruments pointed at the star at all times. (The entire spaceship could not rotate at those speeds, since if it had, the crew would have been thrown against the outer wall with a force of 350 gees.)

In figure 3 is a diagram of the scientific spacecraft, Dragon Slayer. The steady component of the residual gravitational tidal fields around and inside the ship are shown by arrows. In addition to the steady component, there is an alternating acceleration component of about the same magnitude as the steady component, that varies twenty times a second as the four-lobed gravity pattern of the neutron star and tidal compensator masses rotates about the ship five times a second.

The human explorers of Dragon's Egg used gravitational techniques to move into and survive in a synchronous orbit around the neutron star. The prime mover for all of the gravitational maneuvers near Dragon's Egg was a large deorbiter mass. Originally a small planetoid about 1000 kilometers across, it had been picked up (along with other asteroidal debris) by the neutron star in its wanderings. The planetoid was

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condensed by the humans into an ultradense mass 1 kilometer in diameter by injection of magnetic monopoles.

There were actually two large condensed asteroids made at the same time. One was used in a close-encounter gravity whip to drop the deorbiter down from its original orbit out in the "asteroid belt" of the neutron star into the desired orbit. This orbit was highly elliptical with a perigee at 406 kilometers and apogee at 100,000 kilometers, where the human interstellar ship moved in a *12.82 minute circular orbit.*

The elliptical orbit of the deorbiter mass (called Bright's Messenger by pre-contact Cheela) had a period of 4.56 minutes or 9.53 greats of turns of the neutron star. It thus took it only 2.28 minutes or 4.77 greats of turns to drop from the safe circular orbit of the interstellar vehicle to the dangerous synchronous orbit at 406 kilometers above Dragon's Egg.

The gravity field of the neutron star is 400 million gees at the 406 kilometer altitude of Dragon Slayer. However, since the spacecraft was in orbit around the star, most of that 400 million gees was canceled by the fact that it was in a "free-fall" orbit. However, an object is only in "free fall" at its exact center of mass. When the middle of your body is in a "free-fall" orbit around a neutron star at 406,332 meters distance it will feel nothing. But if you are oriented with your feet toward the star, your feet at 406,331 meters away from the star are pulled by a gravity force that is 202 gees more than your middle, while your head, at 406,333 meters distance, is being pulled by a force that is 202 gees less than your middle. If your body is oriented in a direction tangent to the neutron star, your head and feet will feel a 101 gee compression instead of a 202 gee pull. A human cannot survive at a distance of 400 kilometers from a neutron star without some kind of protection from these tidal forces.

To protect the humans in Dragon Slayer from these residual gravity tidal forces, *six tidal compensator* masses were placed in a 200-meter radius ring about the science capsule and arranged so that the plane of the six masses was always at right angles to the direction to the neutron star. The compensator masses were made from asteroids about 250 kilometers in diameter that were condensed down to 100 meters in diameter.

In the center of that ring of ultradense spheres, the masses are attempting to pull anything at the center out toward them. At the exact center of the ring all the forces cancel. If made dense enough and placed at the right distances, the six compensator masses will cancel the neutron star tidal forces over a seven-meter diameter spherical region. (See Figure 3 which shows the residual tidal forces around Dragon Slayer.)

In operation, the six compensators rotate about Dragon Slayer as it orbits the star at 5.018 rps. The individual orbits of the compensator

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masses are almost in a natural gravitational orbit, but require that the masses change speed slightly each half-orbit to maintain the circular formation. This was accomplished by magnetic interactions between the magnetically charged compensators, assisted by trimming maneuvers carried out by robotic probes using monopole-catalyzed fusion rockets.

THE "VISIT"

The only significant personal contact between the Cheela and the humans occurred for a period of 1.2 seconds on 20 June 2050 between Clear-Thinker of the Cheela and Pierre Niven of the humans. This was during a ten-second visit by a Cheela expedition to examine the human spacecraft and the humans inside.

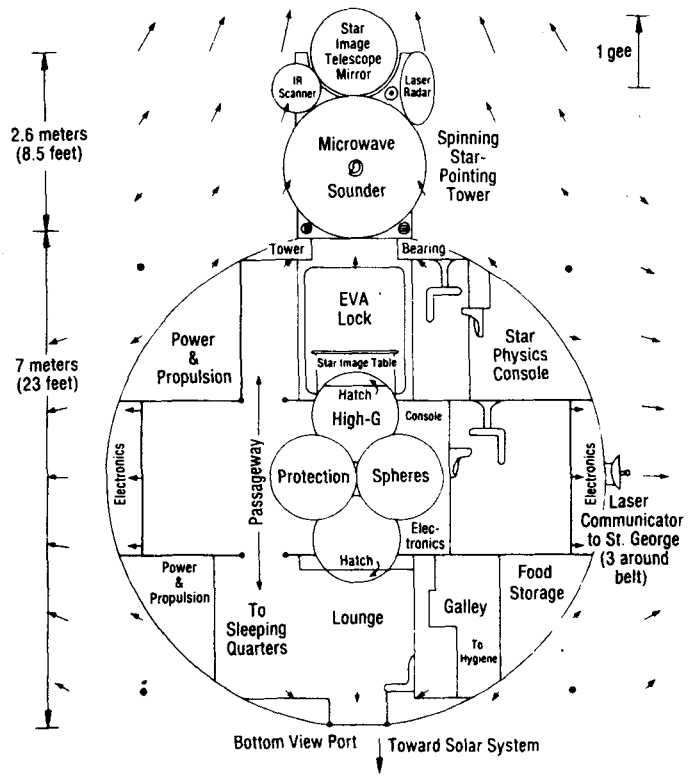

FIGURE 3. *Dragon Slayer*, side view
(arrows indicate steady component of gravity tides).

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The Cheela had to go to great lengths to protect themselves and the humans from the effects of gravity. The Cheela would explode if their bodies were not kept under sufficient gravity to keep their matter in a degenerate state, and gravitational fields that were comfortable to the Cheela were destructive to human flesh.

The main Cheela spacecraft was a crystal shell 4 centimeters in diameter. With its large number of docking pits for the smaller instrumental shells and individual flyers, it had the size and appearance of a golf ball. The main ship had a black hole of 11 billion tons mass at its center that kept the surface of the Cheela ship at a gravitational level of 0.2 million gees. Although nowhere near the gravitational field strength on their neutron star home, the gravity was enough to keep the Cheela from exploding. The gravity field inside the Dragon Slayer at a distance of 15 meters from the main Cheela spacecraft was a reasonable 1/3 gee.

Clear-Thinker used a smaller individual flitter with a much smaller black hole of only 0.22 billion tons mass. This flitter was only 5 millimeters in diameter (just slightly larger than a Cheela body) and the surface gravity again was sufficient to keep Clear-Thinker's body from exploding. This smaller personal flitter could come within 70 centimeters of a human, so that the human eyes could actually see some details of the glowing-hot Cheela body. Even at that, the gravitational field on the nose of the human, Pierre Niven, was over three gees.

We do not know the propulsion technique used by the Cheela to lift their spacecraft off the surface of the neutron star (the escape velocity of Dragon's Egg is ¼ of the speed of light). We also do not know the propulsion technique that they use in space. The human observers during the "Visit," Pierre Niven and Amalita Drake, saw no evidence of any rocket-type mechanism in the Cheela spacecraft. From their conversations with the Cheela communicators, they suspect that the Cheela used some sort of antigravity catapult to get off the star, and some form of inertia drive in space.

At the time of this writing (2056), the knowledge of the antigravity and other Cheela space drives, including a faster-than-light drive, still remains locked in the encrypted sections of the information the Cheela sent to us after they surpassed the human race in development. Finding the key to the encrypted sections requires some knowledge of what is encrypted. In this way, the Cheela make sure that their knowledge is given to the human race as we are ready for it. Present estimates are that we will be able to duplicate the Cheela antigravity catapult (and decode that section) in another ten years. We have only a few clues on the inertia drive. Scientists estimate that it will take us at least two more decades before we learn enough to find the code to that section. ■

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WORLD IN THE CLOUDS

The obvious enemy on Venus was climate—but there was another, unseen, even harder to fight.

BOB BUCKLEY

SYNOPSIS

Roger Teale, while a youth, lived as free-hunting street tough, and by the standards of his peers, was nothing outstanding. He lived. That was the sum total of his efforts, there was little motivation to strive for anything else.

But, in living, Roger made a mistake. He killed. That was not really the mistake... but it did cause a commotion which in turn attracted a roving Federal Welfare patrol. He and his little group of tattered, incorrigible survivors were arrested, brought before a federal magistrate, and quickly sentenced to a life labor term in the planetary colonies. Roger's sentence delivered him to Venus Station, an orbital satellite of the cloudy, inhospitable second planet. The Station was owned by the Sayre Foundation, a vast nonprofit organization whose motivations were nearly as nebulous as the planet undergoing study.

Venus Station was inhabited solely by scientists and technicians. Its roughneck work force consisted of terrestrial convicts. They were expendable, more so if they failed to follow instructions. Roger soon found himself assigned to the first

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manned mission down to the hellish surface of Venus. He and his companions were to establish a mining site. The odds were strongly against success, but that did not seem to bother Chaney, the pilot of the first glider; or Borland, or Beth, Roger's crewmates in the second.

Beth was attractive and more friendly than most of the free technicians had been to a mere convict. Roger, despite his cold, unfeeling facade, began to develop a liking for the girl. But the pressures of the mission, and his own clumsiness got in the way of any progress.

The trip down to the surface was rough. The landing was rougher. In it, Chaney's glider crashed and he was killed. Roger and Borland went out onto the surface in a crawler to retrieve the portable reactor. Without it, they would have no power source for the excavator and the life-saving first chamber of the mine could not be dug.

The reactor, fortunately, was intact. It was dragged out of the wreck on a sledge and rigged on a tow line to the surviving glider. A temporary camp was set up. But Venus had not agreed to allow herself to be colonized. A sudden windstorm wrecks the camp. Borland is killed, and Roger and Beth are forced to flee in the glider.

Whether because of the savage conditions, or through genuine attraction, Roger and Beth develop a bond. They are the only people alive on the surface of Venus. The isolation draws them together.

The mine excavation is started. The first shafts are dug and sealed. The poisonous atmosphere of Venus is pumped out and good air is substituted. The landing, expensive as it was, has proved a success.

After some time spent celebrating together, Roger and Beth call down the support team that will put the mine into full scale operation. Venus has been tamed.

But with the influx of strangers, scientists and free technicians, Roger finds himself an outcast again. He is no longer at the forefront of the action. Beth is busy with her work. He finds himself alone, unimportant, and ignored. Then, while wandering one of the deep shafts, he comes across a scientist, Forsyth, a geologist. Forsyth offers to get him enrolled in the Venus Station college. At first, Roger refuses. But, after reflection, he realizes that it is one way to get a handle on his future. Forsyth accepts his application with pleasure. Beth, however, takes the news with something less than enthusiasm, and accuses Roger of deserting her. The parting is not a pleasant one, and it leaves Roger feeling guilty.

Three months later he is called into Forsyth's private quarters from class. The distressed old man tells Roger that the Mining Station on the surface has been destroyed. Beth is dead.

Roger hits emotional bottom. He goes off and sulks.

The rough life on the streets has given him a certain resilience, how-

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ever. Soon, he is back at class, working very hard to drown out the memories. Also, there are other things to worry about. Like work parties, and faulty equipment. There are times when it seems that Venus Station is falling apart. Money is short, and new supplies are almost nonexistent. There is also a lot of antagonism directed against the Sayre Foundation by the convict students, and even the free students. There have been too many preventable deaths. And other accidents, as well.

Then it is time for grades to come out. Graduation time. Roger is lucky. His work has paid off. He graduates. His buddy, Dennis, is less fortunate. He is set back, and the failure makes him bitter.

But now, Roger's career is really starting. He is hired into Forsyth's section and discovers that the Sayre Foundation is determined to terraform Venus, to make it liveable for men. It is a staggering task. Roger doubts that it can be done...publicly at a party for the new-hires. It wins him few friends.

The next day, as the work periods on the Station are called, Roger and Forsyth witness the test of one of the machines which will tame the savage Venusian conditions. But during the test there is an accident. An accident that looks very, very suspicious....

Sabotage. Roger learns from Forsyth that there is a destructive element making itself known in the colony. The Foundation has no idea who it is, but with a station crewed by convicts there is always a fertile bed for dissent. Forsyth enlists Roger's help in ferreting out the group. For lack of a real name, that is what the countergroup becomes known as, simply, the Group.

But there is more to be accomplished than spying. It is decided to test an atmospheric conversion device and a model Skystation under actual Venusian conditions. Roger, his flight training behind him, is elected as pilot for the mission. There is some dissent about his qualifications from another crew member, but he toughs the situation out, and takes the shuttle down. His new romantic interest goes along, a technician named Irene, and the flight begins well. It can't last, not on Venus, and it doesn't.

After releasing its two remotely controlled test models, the shuttle is seized by an upper atmosphere storm. In the violence of the winds Roger loses control. The shuttle enters a downdraft and dives toward the hellish surface of the planet. It can only be a one-way trip....

8

We found ourselves bathed in the watery sunlight of the upper cloudbank, the autopilot humming softly to itself. I reached out with hands which still trembled and pulled back on the wheel. With a mechanical click the autopilot acknowledged my existence and relinquished control. The shuttle was at my command again.

Dennis was out cold. Gilbert seemed to be asleep. Irene was conscious, but she merely stared at me

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emptily. Her eyes were blank.

"Honey. . .hey, you okay?"

She blinked.

"We must surely be dead. Everything is so strange."

Her voice was a murmur.

"Hey, we're safe. Wake up now."

She shook her head from side to side, sending her hair spinning out around her features in a honey-colored fan.

She didn't understand why we were alive. I don't think I did either. The autopilot was preset to gain altitude as a safety feature. Perhaps the shuttle had slid into the uprushing air column of a thermal and the automatics had done the rest.

Irene fell into strange silence. She didn't speak again until we had brought back the shuttle and had been ferried over to the Station airlock. Then she snuggled up under my shoulder and started to cry. It was a completely unexpected reaction. Awkwardly, I cradled her head in my hand and rocked her, signing to a gawking Gilbert and groggy Dennis to go on without me. They did, although Dennis had to do some pushing to get Gilbert moving.

When Irene looked up at me her eyes were nearly dry, however.

"Thanks, I wanted to talk to you in private."

"You picked a rather old fashioned method to do it."

She grinned.

"If something is good, stick with it."

I gave her a squeeze. "Okay, I wasn't complaining."

"Forsyth and the others will be wanting to debrief us. We won't be able to see each other for a while. But when you're free, come to my cabin. Number Ninety-Seven, Outer Ring."

"For business or pleasure?"

In my mind, I was painting beautiful pictures. This was an unexpected score.

"You just be there. Understand?"

She was completely serious, almost grim in her attitude.

"I'll be there," I told her. "I'll knock twice."

"The door will be unlocked. Don't knock at all."

And with those curious words delivered, she was gone down the hallway leaving me in the silence of a deserted lock chamber.

As soon as I stepped into the lab I knew something had gone wrong. Forsyth was standing beside one of the tables with his hands thrust deeply into the pockets of his white lab coat. Smyth was seated in a chair just before the same table. His expression was just as sour, only more so.

They both turned and looked at me when I came in. There was no sign of Dennis or Gilbert. But Irene was already huddled in consultation with one of the senior techs at the far end of the lab enclosure.

"Something's happened, I can see it on your faces. What's with the Skystation?"

"The Skystation is just fine. We're receiving signals loud and clear. The storm tossed her around, but there wasn't any damage to her systems."

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"And VACU?"

"Down the tubes," Smyth exploded as if he were having difficulty keeping quiet. "Almost a million dollars right down the tubes."

Forsyth was on the defensive.

"Whatever the design problem is, it can be overcome. We can't give up, now. VACU is the keystone of the entire program. Without it, we may as well not bother with the Skystations."

"Your condenser dropped like a stone thirty minutes after it was launched. I agree that you have a design problem. A serious problem. And it just got worse because I'm cutting the project right out of the budget. Build your Skystation! Get it operational, and then have your people present me with a proposal for a redesigned VACU. I'll reconsider it for the next fiscal budget. . . maybe."

Smyth was older than Forsyth, and smaller. And he exuded energy. Sometimes it seemed as though he were going to explode with the bottled up pressure seething inside him.

"You're a lucky man, Teale. Skilled, too. You did a good job getting our people back. I'm going to keep an eye on you. Just make sure that you don't let your past slip you up."

When the door had shut behind him I found myself wondering just what he had meant. Had I just been given a compliment, or a warning?

I walked over to Forsyth.

"You were catching it. Nothing we did, I hope."

"No. The same storm that nearly scuttled you must have blasted VACU. We lost it forty minutes after the launch. Not sure why the Skystation model survived, it was larger. Presumably, it would have made a bigger target. But nothing happened to it."

"Guess you did something right." I sat down. "I'm hungry. Could we have some grub brought up here before you drain my brain?"

"Sure," Forsyth said absently. He waved at a distant tech, who seemed to understand.

"Will Smyth really cut the project out of the budget?"

"He's undoubtedly having his secretary prepare the notice at this very moment. Smyth doesn't make empty threats. He's fair enough in his way, but bloody direct when he is displeased."

"What's so great about VACU? It didn't seem to do much more than

Man needs the mystery and romance of new horizons almost as much as food and shelter. In the difficult years ahead we should not forget that the Snows of Olympus (on Mars) lie silent beneath the stars, waiting for our grandchildren.

ARTHUR C. CLARKE

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make smoke rings when I saw it in the wind tunnel."

"VACU is the only practical way to thin out the Venusian atmosphere." Forsyth made a dramatic gesture at the floor which must have been intended to refer to the planet spinning far beneath us.

"Venus is pure hell. The idea of raising a family there is absurd. The greatest PR man in the solar system couldn't convince colonists to settle. Mankind needs an Earthlike environment in which to survive and prosper, that's why the Skystation concept will never be more than a stopgap, a jury rig to survival until we can actually get going on changing Venus into a sister to Earth. It *can* be done, the atmosphere is the secret. We just have to make that planet down there live, Roger. Do you understand?"

"Sure, pops. But I think you're sort of jumping the gun. Get your Skystations up in the atmosphere before you start making plans for putting farms on the surface. I'm just a dumb punky, but I know that it's going to take thousands of years even at our best working speed to make any dent in the structure of an entire planet. Neither one of us will live to see even the beginning take form."

"You're sure of that, boy?"

Forsyth looked at me oddly. I figured that he might get angry, but he didn't. He was as cool as ice as he stood there staring at me with those piercing blue eyes. They were like a pair of glaciers capped by the snowbridges of his bushy eyebrows.

"I think you're a little crazy about the subject. Nothing personal, you understand."

"Of course not."

The tech was coming with a bag of sandwiches and a mug of steaming cocoa. Forsyth had him put them on the table before me.

"Someday, Roger," he went on after the tech had gone back to his duties. "Someday, you may find yourself afflicted with a similar madness. At least I hope so. It's that delicious form of madness that makes life worth living.

"Now then," he flicked on a tape recorder. "Let's take it from the top. Start from where you first entered the atmosphere...."

9

You can't make something out of nothing. That's an old truth that numerous men and women have been attempting to disprove for generations.

And the act was still going on.

Venus was nothing...at least in comparison to other worlds that we were familiar with. Our recent saga of hardship and fear as it was fleshed out for Forsyth was grim and unpleasant, just like the place we had been visiting.

But was he dismayed?

Not in the least. He merely used our data to elaborate on his already elaborate ideas.

A week passed swiftly. We were expecting some change in plans. But none appeared. Our schedule had been hurt, but the scheme of developing a useful, safe Skystation was proceeding as usual.

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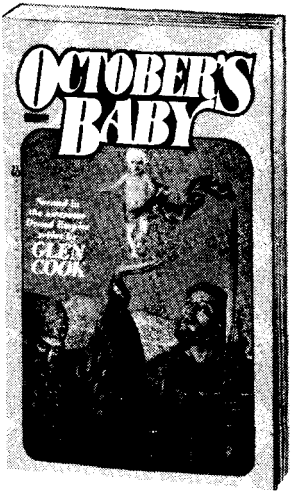

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God, but did we work. A dray horse had an easy time of it when compared to us. There wasn't any free time, the job was our very life. And if someone had asked me a year ago if this was the way I wanted to live I would have called them crazy. But here I was, nose to the so-called grindstone, and loving it.

Irene had something to do with that. We were closer, now. But it was nothing more than a friendship. I had given up on my devious plans even though she was extremely pretty. I had another 'flame' who was providing off-duty romancing, and so Irene and I were entangled in a sophisticated, almost intangible relationship that didn't involve a lot of touching. Now Bonnie was another story entirely. She was hot stuff. This curvy little brunette was wearing me out and I was determined to keep it that way, while insuring that business and romance remained separate entities. After all, that combination can create problems.

Still, with Irene, our projects were bringing us into close conjunction more and more, and she was easy to talk to. That was one thing Bonnie and I didn't do much of...talk. She wouldn't have understood my job, anyway. Bonnie was a service girl in the Station cafeteria. How do you explain the finer points of atmospheric convection to someone who scrubs steam tables and passes dishes around all day? No, Bonnie's talents weren't in conversation.

As time passed, and the prefabricated sections of the Skystation neared completion, Irene and I began to take strolls. Sometimes I'd walk with her to her cabin before saying goodbye. Sometimes we would have a late drink.

And abruptly there was no longer a reason to talk.

Funny how things can slip up on you when you let your guard down.

Dennis was another matter. I was still trying to get him transferred permanently into our group. Of late, he had been acting strangely, distant and distracted. My guess was that he was feeling left out. I saw of lot of myself, as I had been in the recent past, reflected in him. The kid was searching, seeking to discover himself. He wanted to be important, but success was eluding him. As always, there was more than one path to follow, and his choices in the past had been bad ones. I wanted to help out, to be his 'roadsign.' But you don't listen to others at that age, the private wisdom of youth seals your ears. So Dennis was going to have to pick his own way.

The truth was, we had our own lives to lead, our own choices to make. I couldn't guide him, nor did I want to. That would have been foolish.

Dennis was his own man.

It was dark in the exercise room. This was the mid-shift and only a few Station duty clerks were at work. The remainder of the staff was asleep. Everyone except Dennis.

He let go of the weight bar and it slid up out of his way with a whisper

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of greased metal on metal. He was trying to ignore the other shadowy figure but he wasn't having much success.

"You don't owe the Foundation anything, kid. Look how you've been treated so far. This is the second time you've been set back. If it happens again you go back to Earth in disgrace. How will your family react to that after all the money they've spent on your education and such? Transportation out to Venus Station isn't cheap."

Dennis didn't know the speaker. In fact, he'd never seen the man before. He was wearing the blue coveralls of a Station electrician. Was this meeting merely accident? It must be. He doubted that anyone else knew of his 'nocturnal' exercise sessions. He had fallen into the habit mainly because it helped him sleep better, and because the solitude gave him an opportunity to think. But this time he had discovered himself with a visitor.

"I still don't understand," he protested. "What is it you're interested in? What is it you want me to do?"

The stranger hoisted himself onto the cloth covered back of an exercise 'horse.'

"My employer is quite wealthy, and he doesn't mind sharing his wealth with men who share his ideals and give him their loyalty. The colonies are beginning to grow into powerful entities apart from Earth. For that reason, he feels that Venus shouldn't belong to one powerful corporation. Like the Earth, it should be free for the use of all people. Once the Foundation gets a toehold in the upper atmosphere it will only strengthen its already iron control until it owns the entire planet. That's wrong. Don't you agree?"

Dennis didn't say anything. His thoughts were whirling in his head too rapidly for him to sort them out. Most of all, he didn't want to commit himself, to give this stranger something to use against him. He might be a Station Security man trained to spot malcontents. This might be a trap.

The stranger smiled.

"Okay, kid. I don't mean to force you into anything. But think on what I've said. Our group is like a debating society. We meet to discuss ideas that the Foundation might not like to hear expressed openly. If you get curious about us, look me up. Leave a note in the electrical check box on bulkhead 237, level 6. I'll get in touch."

As the stranger moved away into the shadows, Dennis began to lift the exercise bar. But he quit after a few tries. His heart wasn't in it any more.

When Dennis first related his story to me I didn't believe him. It seemed too far-fetched. This was Venus Station, a closed, tightly-knit society of scientists and workers orbiting around the second planet of our sun. We were godforsaken and isolated from everything. True, we had some rough customers on board, but this spy stuff was out of line.

I suspected the boy of being paranoid, a common ailment bred of loneliness and frustration. And we

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had more than enough of both to go around.

But Dennis was genuinely disturbed, that was plain, and if he trusted me enough to tell me of the meeting I wasn't going to betray that trust by laughing in his face.

Instead, I suggested that he exercise less and study more. Irene's offer to tutor was still open, and his grades were the most important thing in his life at that point in time. If he failed again it would be like a proud ship going on the rocks. The sharp fangs of the stony shore of the Foundation would tear the hull of his ego to slivers and he'd spend the rest of his days in some pedestrian job with his brain and imagination decaying to rust.

That was no future for anyone. And he agreed.

I thought that settled the matter. Boy, was I wrong!

Two days later it was revealed that the Skystation Program was soon to be activated. Smyth called a meeting and made it clear that he expected one hundred per cent attendance.

Rumors in the halls had warned us of the impending gathering. Secrets had ways of becoming known on board the Station. This was just one aspect of human nature, and mostly harmless.

At the appointed time the work crews assembled in the lounge.

The lights went dim and the projector started.

The screen across the long, narrow room flickered and lit up with a foggy image. Clouds, dense and yellow, drifted through the view. One might almost have expected to see some soaring bird flash into view. Instead, the dark, winged shape of a shuttle appeared out of the mists. The camera began to pace the vehicle.

"Step one begins with the deployment of the main buoyancy tank."

The voice paused while the image on the screen maneuvered. The shuttle's upper cargo hatch began to open. The sequence was slightly accelerated. Once the doors were securely locked open, a floppy sphere bulged from the opening and began to inflate. It drifted away slowly.

"Now comes the dangerous part."

A nervous laugh rippled through the audience.

Irene nudged me.

"Smyth is probably puzzled about the laughter. For an economic genius, he's as dense as a brick when it comes to understanding human reactions."

Smyth's voice continued.

"A framework must be attached to the outer skin of the buoyancy tank. It is on this frame that the shell of the station will be mounted. Each joint must be fixed securely and all bare metal covered at once with a sealing agent to prevent corrosive attack. As you probably understand by now, the construction must proceed rapidly and in sequence if we are to succeed."

On the screen, tiny figures had climbed from the cargo hatch of the shuttle and were using jet-assisted balloon packs to drift over to the isolated sphere that was the fully inflated tank. They suspended braces between them. One by one, with care-

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ful attention to balance, the tank was encapsulated with a cage-work of reinforced plastic. The number of workers grew as the framework expanded. It began to take on a rough saucer-shape.

"Well, whatever you do," Irene quipped. "Don't look down."

Another buoyancy tank was ferried across. Then three more. They were sealed into the frame and inflated from the helium tanks that a worker in a tiny gyrojet had brought over. More framework was laid over the growing core until the design was completed.

"Next, we apply a protective skin, an envelope of 'fast-seal' over plastic webbing. Then, multiple layers of chemically stable insulation, and a metallic foil to reflect heat radiation. When this is in place, the entire hull is covered with a sprayed-on sealer that sets up hard and rigid to provide extra strength. This final coating is a teflon-based plastic to ward off acid erosion. As time passes, it will produce an additional protective layer simply by weathering."

Smyth paused for breath.

"Finally, a transponder and flashing strobe are mounted so that the Station may be located easily."

The animated instruction film depicted each step in the assembly, repeating some steps in greater detail for the benefit of the technicians who would do the actual work.

Abruptly the screen flashed white and the room lights pulsed to full brightness.

Everyone blinked, and rubbed at their eyes, murmuring to their neighbors.

Smyth resumed the podium. It was rumored that he had never been more than a marginally effective scientist. But he was an excellent administrator and mover of men.

"I won't diminish the dangers inherent in an operation such as the one you people are about to undertake. Each of you, at one time or another, will find yourselves suspended in midair, dangling fully-suited from balloon packs, all the while being carried along in the winds of the cloudbanks. Such a combination makes for great epic poetry...and short lifespans. But don't think that we are abandoning you to the elements. A rescue fleet of three airtrucks equipped with gyrojets will patrol the lower altitudes to pick up anyone unfortunate enough to need help. Each of you will have the best and newest equipment. You have been briefed on the use of the radio net, and on circuit discipline. I want this effort to have zero-defects, zero-mistakes, and not a single death. If together you are careful of yourselves and each other, and follow the program precisely there will be no difficulties. Remember that, follow the program!

"Are there any questions?"

That was merely a formality. I knew that each of the work teams had already been briefed and drilled by their crew chiefs until they knew the procedures front to back. They could repeat them over in their sleep, and some of them actually had been overheard doing just that. Everyone had

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to understand everyone else's job just in case there were accidents and key people were lost. Even with all the attention to detail, there had to be losses. I didn't see how we could avoid them. We were about to engage in a battle. A battle against Venus herself, with our survival as the stakes. She would be ready for us with her best surprises. She had never let us down on that account.

The crucial thing would be the timing of the construction. If the teams were delayed, the corrosive atmosphere would begin to destroy the station before we could finish it. The metal would crumble into dust, the plastic would craze and become brittle. Everything would fall apart and we would be left hanging around with long faces, literally.

I suppose Smyth realized that. But he wasn't about to mention it. His was possibly the worst job. He would have to wait and worry and determine if everything we had been given and taught was pertinent and directly applicable to the job. And he would have to notify the relatives if we failed.

I wasn't worried. I didn't have anyone needing notification except for the federal parole board.

"Very well," he finished. "Good luck. This meeting is dismissed."

As the noise of conversation started and swelled to fill the chamber, I took Irene by the arm and led her from the confusion.

"Lunch?"

"Why not?" She smiled with an impish expression. "You don't mind if Forsyth joins us, do you? He insisted that I see him."

"I don't see that I have a choice. Just hope he buys his own lunch."

The corridor was practically deserted, but behind us, I could hear the room emptying. The passage wouldn't stay clear for long. I quickened our pace to avoid the mob that would surely pile up around the entrance of the cafeteria in a few short minutes.

"You didn't see Dennis at the meeting, did you?" I asked suddenly.

"Haven't seen the kid for hours. I assumed that he was on a work detail. Worried about him?"

I was. "He's been more and more troubled recently. I guess it's his grades. He's smart, but he has trouble concentrating on anything that he really isn't interested in. I'm that way myself, really. That's probably why I understand what it is that he's going through."

"I've been helping him some with chemistry. I'll have more time once the station is built. Want me to expand my operations?"

"Would you?" I hugged her lightly. "That would be great. Just for that, I'll buy your lunch, as well as giving you the pleasure of my company. That's just to show you how grateful I can be."

"How underwhelming."

Arm in arm, we headed for the steam tables.

Forsyth didn't really have anything of importance to say, he just wanted to wish us luck on the new venture, and to introduce me to my fellow

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pilot, the captain of the second shuttle. His name was Callaghan, George L. Callaghan. At first, the name meant nothing to me. Then the memories surged back and I realized that this was the Callaghan who had gone down to view the ruin of Mining Station Charlie. My station, the one that Beth and I had practically dug with our own hands.

A black mood came over me as I stood up to shake hands.

Callaghan was short and fair. He walked with a slight limp, an injury that he had picked up while 'bailing out' of a disabled equipment transporter that had decided to take off for deep space with him still aboard, or so he explained.

We sat and for a long moment no one could think of anything to say. The food arrayed on the table, as unimpressive as it was, received a lot of attention.

"I'm not here to resurrect old wounds, Captain Teale," Callaghan said finally. "I realize your involvement with the surface station was more than incidental. My assignment was given though, and I have no alternative but to carry it out. I hope we can work together for a common future, and not labor over something that happened in the past."

"I buried Beth a long time ago. Seeing you, though, brought everything back. Let's not discuss it further. You have 'A' Team?"

"Yes, we'll be releasing the first buoyancy tank, and supplying others as they are needed. I believe we have the easy part. Your team will handle the tricky stuff. I don't envy you."

I laughed.

"That's just what my team said about your job. Guess we do have something in common."

There wasn't much else of substance to discuss. As lunch wore on, we got to know each other, man to man. It was useful. Finally, Callaghan made his apologies and left, saying that he had to make sure that his ship was being prepared properly.

When he was gone, I looked intently at Forsyth.

"You planned it this way, didn't you?"

He nodded silently.

"Knowing that if we were to have met later on, while the operation was in progress, my performance might have suffered."

"Merely a harmless psychological ploy. But a needed one, I felt. I will apologize for manipulating your emotions at a later date."

He grinned then. What was left of my anger seeped away. It's very difficult to stay mad at an old man who has your own best interests so firmly in mind.

Irene touched my shoulder.

"Actually it was as much my idea as Forsyth's. You'll just have to be mad at both of us, if that's the way it's going to be."

I pushed my untouched dessert over in front of her, an imitation strawberry confection with lots of fattening whipped cream mounded on top.

"Peace, my dear. I'm mad at no

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one but that ball of fog waiting beneath us. The goddess will be the only one to feel my wrath in the coming week."

"In that case," Forsyth said, saluting me with his drink, grinning broadly, "the first Skystation is already history. I'll notify Smyth, immediately."

10

Three days later, as per orders, we were back in the soup.

Perhaps the term 'soup' needs a little explanation. It's a one-word description of the atmosphere, but, like most simplistic summations, it leaves out a lot of details. And Venus is a complex place. The surface of the planet may be a flat, over-heated, under-lighted, pressure cooker, and boring to boot. But the atmosphere is anything but. It's wild.

The meteorologists up at Venus Station had already explained that there were really three cloud envelopes surrounding the planet, so it wasn't just one big storm. The ionosphere began about 155 miles above the surface. This was the point of sensible atmosphere. At ninety miles you found yourself in the turbopause. It was still clear, no cloud layers up this far, just a few cirrus formations hanging over the 'polar holes'; yeah, holes. At the poles a lot of superheated air comes boiling up through all three cloud layers and the result is like a big window. But you still can't see the surface of Venus, any more than you could look at the bottom of an ocean through five miles of clear water. The air is just too thick.

The turbopause has detectable amounts of atomic oxygen and other ions, but this is still high altitude stuff. It's not until you get down to the exobase that you begin seeing the real atmosphere. That's about 100 miles up. Now you're in some haze, and your instruments start picking up ions of magnesium and iron, atomic cinders of a lot of old meteorites. Not very much gets down to the surface from space unless it's got retro-rockets. Ever try to fire a pistol through a box of cotton wadding? That's the effect when a meteor tries to smack Venus, it just can't punch its way through all the soup.

Our shuttle was down at the clear interface over the third cloud layer about thirty-three miles up.

Above us, the first layer was like thick haze, and full of sulphuric acid droplets about one micrometer in diameter. You could see about four miles on a good day. The temperature was above freezing, but just barely, and the atmospheric pressure was about half that of the Earth at sea level. It really wasn't that bad. Lots of carbon dioxide, some nitrogen, and a little argon and neon.

The next layer got a little more nasty. At thirty-five miles the haze got thicker, and more yellow because you started running into liquid and solid sulphur particles, about 100 particles per cubic centimeter. Visibility was around one mile, and the temperature was up over one hundred degrees. If

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you could get out and walk around you'd think you were in a stinking dust-storm in a desert. There was some water vapor, but it was acid.

Then you ran into a clear space in the clouds. No one is sure what causes it, but it runs all the way around the planet like a bubble in a high class pastry crust. It's hot here, not hot enough to kill, but hot enough to be damned uncomfortable. Sometimes it rains, or perhaps 'steams' is a better word to use. The steam is sulphuric acid.

Below the clear space the clouds begin in earnest. At the cloud tops the pressure rises until it matches that of the Earth at sea level, but it's hot, about 180 degrees. There's a little oxygen, some sulphur dioxide, and a lot of acid droplets in suspension. And when it rains up here it will take your hide off in a matter of minutes.

But that's not the really bad part. It's the storms that make a pilot's life interesting. Venus Station once recorded a thunder peal that went on for over an hour. Lightning was playing among the clouds, and once the discharge path was opened, it just went on and on. When the sky starts getting light beneath you, well, you get out and grab altitude fast, because if the lightning doesn't get you, the winds will. The updrafts and downdrafts can be fatal simply because they can tear a shuttle to very small pieces, and once the protective shielding of a shuttle is breached the acids will etch all the strength out of the metal. The oxidizing reactions taking place in the lower cloudbank are impressive and more than a little frightening if you are prone to riding around in something fabricated out of metal.

Like we were.

We had completed the first stages of construction. The experimental Skystation was being assembled piece by piece, in module form. The last two sections were to be fitted on this descent. So far, there had been no accidents. Things were going according to plan... and that worried me. It just wasn't right. Something had to go wrong. I was wracking my brain trying to figure out what it would be.

Even the weather, for Venus, was remarkably calm. We were racing above the cloud ceiling, smashing through cloud towers and ridges at intervals as we neared the drop point. The construction site itself was below, shrouded in the poisonous fogs sweeping past in curdled streamers. Radar showed the position of the site even if I couldn't see it visually. But I had been hoping that the clouds would have stayed low and kept the station in clear air.

The steady beeping of the transponder signal rose in pitch.

"We've passed the site," Dennis reported from his monitoring position. He pushed the earphones up on his head. "Take her around again. I'll release iodide crystals as we overfly the target."

"Try the nitrate gel first," Irene suggested over the common radio net with Callaghan's shuttle. They were circling overhead in a holding pattern.

I made two passes, but the clouds

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were thick and stubborn. They held.

"Guess we have to do it blind, kid," I told him, and pulled back on the throttles and brought us around in a banking curve. "Read off the figures."

I leveled the shuttle, then started the descent into the clouds. Our target: a pip of light winking on the radar screen.

"I have the site three points off the bow... fifty yards, closing rapidly." Dennis sounded tense. That made two of us.

There was still nothing to be seen on the screens but brown fog.

Retroes fired, the shuttle slowed. At ten yards I brought us into a hover, but knew that we couldn't hold it long. The fuel-feed gauge was showing the motors gulping nitrazine at a frightening rate.

"Hey!" Dennis shouted, and pointed.

The clouds parted abruptly. The station framework with its flashing scarlet and blue strobes swam into view on the screens. Clouds framed it in hazy mists. One of the previous crews had painted a large 'GOOD LUCK' in blurry letters across one of the outer panels. Seeing it, I smiled, and some of the tenseness eased. There *were* people out there. We had made our mark.

The station assembly crew was suited up and waiting in the shuttle cargo bay for the word to go out. I switched into the crew chief's circuit. "This is it. The site is stable and holding in the air well. Get ready to float your module out there."

Then I made a call to Callaghan in the second shuttle.

"We're in position. Make your approach from the west and let's get this over with."

"We're on our way," Callaghan acknowledged.

Without the other team and their module the mounting would not come off. Both assemblies had to be attached at the same time or the buoyancy tank would overbalance on one side and tip. That would make the final assembly practically impossible.

But Callaghan's people were good. His shuttle lights hove into view minutes later. The big cargo bay doors were already opening. It was time to let my own crew out. Soon, I could see workers dimly through the drifting curtains of mist.

My crew chief, Mike Travis, reported in. "We're out, Captain. Everything looks good, so far. Let us know if you see any weather coming."

"Right, Mike. Good luck to you and your people."

At this point I could have relaxed, but I didn't. 'Couldn't' was perhaps a better word.

"Anything showing on the radar, Dennis?"

"Scope clear. Calm air all around."

So far so good. I watched as the two pie-shaped modules were floated into position and seated into the EASY-GRAB mounts. Blue flashes told of welding taking place. Twenty minutes dragged past.

"TEALE . . . MODULES ARE ATTACHED.

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WE ARE RETURNING HOME."

That was Callaghan's mob. I switched to my own work crew's frequency for a status report.

"HOW GOES IT, BOYS?" I was getting anxious.

"ALMOST FINISHED, CAPTAIN. LARRY WANTS TO CHECK THE HELIUM CONTAINERS ONE MORE TIME. CAN YOU GIVE US FIVE MINUTES?"

"How's the radar look, Dennis?" It was an innocent question but as I turned to look at the boy, I was shocked to see how pale he was.

"Are you sick?" I asked.

"No, not a-at al-l-," he stammered. The screen painted his features in a greenish light. "There's a cloud mass riding in from the east that might be dangerous."

"YOU'VE GOT YOUR FIVE. BUT DON'T DRAG IT OUT. STORM COMING."

"RIGHT, CAPTAIN." My warning was acknowledged almost at once.

The cabin of the airtruck became very quiet. The only sound was the pinging of the station transponder and Dennis drumming his fingers on the radar console.

I stared at the boy. Something seemed very wrong.

"Sure you aren't sick?"

"I'm not sick," Dennis snapped. "It's nerves, just nerves."

"I think you're making me nervous, too." I thumbed the radio switch.

"MIKE, HAVE YOUR PEOPLE SEARCH THE MODULE."

"WHAT ARE WE LOOKING FOR, CAPTAIN?"

I kept staring steadily at Dennis.

"I DON'T KNOW, MIKE. BUT BE THOROUGH. AND BE CAREFUL."

More silent minutes went past. Thunder muttered in the distance and the first buffetings of a rising wind began to shove the shuttle around.

"Get them back, Captain." Dennis looked very frightened now. "They're going to be killed, all of them." His voice shook.

Still gazing at the boy, I activated the radio.

"KEEP SEARCHING, MIKE. YOU'VE GOT ALL THE TIME IN THE WORLD." Perhaps I was being cruel, but lives were at stake.

"No! No, they don't; it's a bomb, Roger. A bomb! I planted it myself in the reactor room. Tell Larry. It's above the shielding tray...magnetic clamps...."

The boy was still jabbering as I began relaying the information.

11

The room was almost too quiet.

Dennis was sitting tensely in the spindly chair, well forward in an uncomfortable position, his hands on his knees. The stiff fabric of his coverall rustled as he moved slightly.

He had been silent ever since the bomb had been discovered and tossed out. It had gone off in the clouds far below, the white glare of the detonation visible even up where we were. The shock wave of the blast moved the shuttle in a gentle tidal wave of air. Up and down, up and down, we rocked. On the screens, the partially completed Skystation had swayed like a flimsy

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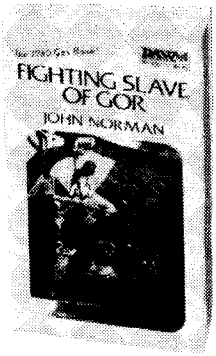

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wooden dock in a powerful swell.

The blast had revealed something to Dennis. It had been much stronger than required to simply blow apart the Skystation and 'sink' it. The explosion would have destroyed both of the attending shuttles and their crews, as well. It had been meant to be a thorough job. There would have been no tales, no rumors of hidden bombs. Our task would fail, probable cause, a storm. There was no shortage of deadly storms in the atmosphere of Venus. They were a believable foil.

Since then the boy had wrapped himself in a strange silence.

I meant to break him out of it.

We were alone in the room. I hadn't told anyone where I had gotten my suspicions about a bomb, except to let slip to Callaghan that my radio had begun to pick up a curious signal that had seemed out of place. It had been a lie, but I wasn't ready to take him into my confidence. Not yet.

I passed over a steaming mug of chocolate.

"This will put a little spirit back into you."

He took the drink glumly, not seeming to notice how hot the liquid was. He took a slow sip off the top, and the steam wreathed his face.

I plopped myself down into a couch well across the room.

"When Beth was killed I developed a good-sized hate for the Foundation. It seemed as though it was a cold-blooded gang of wealthy butchers intent on sending the rest of us down to get ourselves killed for nothing. I think I must have been very close to planting bombs, then, myself.

"What made you do it? The bad grades?"

"They were threatening to send me back to Earth as a dropout." He stared over at me with black, hot eyes. "Do you realize what that would have meant? God, I couldn't bear it."

"So, the bomb was all your idea."

I purposefully made it seem like a statement. It worked. The boy squirmed. I didn't want him to control this interview. I had to keep him reacting to my jabs, had to keep him worried and uncomfortable.

"You really hated us that badly, to want to kill us all? I thought you considered us friends. How did we treat you so badly?"

"No!" He was on his feet, now.

"I wasn't out to get you, just the Foundation. The Skystation was supposed to blow up after we had left it behind. I wasn't trying to hurt anyone. But Bill kept piddling around down there and I knew the damn thing was set to go off. God! I kept waiting for him to leave. But he wouldn't."

The boy was pacing, back and forth, back and forth.

I let him sweat and kept quiet. Unknown to him, everything was going on tape. I wasn't sure yet if I wanted to hang him, or bring him around to our side. That decision was waiting on what he told me, and whether or not he was leveling. If he was lying to save his own skin, I'd dump him out the waste valve myself, so help me.

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"The Group contacted me sometime after final grades were posted. I guess they knew I was down and mad. But they didn't ask me to do anything, then. They just had one of their boys talk to me, and tell me how to get in touch with them."

I wanted badly at that moment to demand *how* to get in touch, but the timing wasn't right. Dennis was talking. I had to be patient, let him finish out the story at his own speed. The answer would come if I were patient.

"And so, I did. You had brought me into Forsyth's project, by then. But I was treated like a flunky. The Group made me feel important, like I was somebody." He stopped pacing and looked at me. "That was dumb, huh? They used me, didn't they?"

"The bomb," I told him flatly, "was powerful enough to wipe out everybody along with the Skystation. The Group wasn't intending to have any witnesses coming up here to blab about strange explosions. Apparently they feel their operatives are expendable. But it's noble, I guess, believing in a cause so strongly that you would die for it."

"Bull," Dennis spat. "I never bargained for that. I just wanted to strike back at the Foundation. They told me that when the project failed we would all be sent back to Earth. I wanted that. It would have meant saving my reputation, and would have gotten me out of here. You don't know how much I *do* want to go back."

"When did you plant the bomb?"

"After the module had been loaded and inspected by your assembly team. That was tricky. Bill almost caught me, but I told him that I was looking over the ejection circuitry."

"Where did you get it?"

"A message left at the regular pick-up site told me where to find it. The device was already assembled and disguised as a transponder power pack. I carried it around with me for two days and nobody suspected."

"We aren't given to expecting bomb plots out here, Dennis. These people are supposed to be your friends. The Group you love so much is importing 'hate' from Earth. They've a lot to go around, back there."

"I don't love the Group, honest. They used me. I don't see now how I'll ever get the chance. But if I do get away from you, I'll look up my contact and tear him apart. That's fact!"

"I find that a little hard to believe," I told him dryly. It was time for him to squirm.

But the boy didn't squirm, he merely collapsed into himself again and became quiet.

"I don't care what you believe," he muttered as much to himself as to me. "It's over, now. All over. Just make it quick when you execute me."

"What makes you think we're going to execute you?"

"I'm a realist."

"So, a realist."

I got slowly to my feet, snapped off the recorder and flipped the cassette out. I made a big show of putting it in my pocket.

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"First, I'm going to run this through the stress analyzer to see if you're telling me the truth. Afterwards, if you've been playing straight with me, we just might give you that chance you were talking about to get even with the Group. But that will be up to Forsyth and Smyth. Meanwhile, wait here for me."

I left unspoken the thought that if he did run, his execution would be a sure thing. I think the kid realized that, though.

I left the door unlocked. There was no need for a physical lock. Mechanical devices can be broken, but if the kid were straight, his own sense of honor would keep him glued to that chair as if he had been chained. It was the best test of his loyalty that I could have devised.

One question nagged at me as I dashed up the corridor. How much could I trust Dennis? Was he more devious and cunning than he appeared? Who was manipulating who?

Forsyth was waiting for me in the lab with Smyth. We could be alone, the mid-shift crew had been dismissed.

We withdrew into an inner office and sealed the doors.

I put the tape cassette into a player and we listened to the interview twice.

Finally, Forsyth reached out and shut the machine off.

"I've heard enough. Let's give the kid some rope. Maybe he can lead us to the rest of this gang."

"We'd be fools to let him go free," Smyth snapped. "Kill the punk."

"I don't like that word very much," I told the old man warningly. He frowned and looked away.

"Forsyth, you will be making a large mistake if you trust that youngster. He is trying to save his own skin. He'll repay your mercy with nothing but more viciousness. I know those street types."

He was looking at me directly when he said that.

I gave him a sweet smile in return.

"I don't wish to disillusion you, Director, but Dennis didn't come to you from the slums. His father is an Administrator with one of the large Syntho-oil producers. He's a product of your subculture, not mine."

Smyth harumped deprecatingly.

"Whatever, my vote is to dump the little punk out a valve and let him squirm."

"I'm beginning to wonder just who the killer is in this case," Forsyth snapped. "Here we have a choice road into the heart of this mysterious hidden Group of troublemakers and you're trying to throw it away. I vote we use the kid to our means and convert him to our thinking. He's ripe for a change."

"I concur," I added.

"Your vote counts for practically nothing," Smyth snapped at me.

I stood slowly, squeezed his lapels together and lifted the old man above the table until he was drawn forward like a bow. It was an extremely uncomfortable position, since he was forced to balance on his tiptoes.

"I'm good enough to risk my life for the Foundation...I helped build

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your precious Skystation, and I even helped save it and the technicians and scientists who were down there with me. Is this the kind of respect your Foundation tenders to loyal employees? I'm beginning to think I was all wrong. Dennis may have been right about you people. Let's talk to him about this matter face to face. And if you still don't like his answers, you can push him out a valve yourself."

Then Forsyth was unlacing my tight fingers and pushing both of us apart.

"We'll get nowhere like this," he complained petulantly.

Smyth walked over to the door and stood there a moment preening himself like a ruffled bantam rooster.

"Forsyth, you do what you want with the boy. But if this scheme blows up in your face, I'll have the lot of you in front of a full committee. And that goes for you double, Teale."

But he never looked me in the eye. Not once. And then Forsyth and I were alone in the room with the echoes of the slammed door still ringing in our ears.

"Touchy, isn't he?"

Forsyth grimaced.

"You're going to get yourself in trouble one of these days, my boy. Smyth is an important man, his opinions carry a lot of weight with the Board of Directors. You'll get nowhere fast in this operation if you don't have his good will."

"I don't need that kind of good will. Now then, what are we going to do about Dennis?"

"Dennis is going to be our double agent. I want you and Callaghan to follow up on the investigation until you can give me names and the plans they have been developing for the future. We're going to follow their lines of communication all the way back to Earth."

Dennis was still waiting in the room when I got back. He watched intently as I put a match to the incriminating cassette and let it burn to a blob of smoking plastic in a wastebasket.

"That's your past. We're going to build you a new future. Ready for that Dennis?"

He nodded vigorously.

"Good," I told him. "That's good."

Two hours later Callaghan and I were deep in our plot. Dennis was past the talking stage. He had been listening and nodding, but had long since exhausted himself of usable schemes.

Our plan was relatively simple. Dennis would leave a report of his activities, and information on why the bomb had been discovered, in the normal place. Then he would drop out of sight until a reply was received. Callaghan and I were sure that the Group would require a better explanation, and so would call the boy into a meeting with one of their operatives. Once there, he would 'break down' under questioning and admit that he had told of his involvement in the Group. But he would mellow this exposure by saying that I was mightily interested in joining up. Then, he would describe my past. If that bit of juicy history didn't get me accepted into the inner council, nothing would.

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The only thing touchy about the scheme was that it would require lots of waiting. And I was eager to get on with rooting the SOBs out. We were going to finish the Skystation in a few days and I didn't want anything, or any Group to foul things up. I was beginning to become very fond of that little cottage in the sky, alone and desolate as it was down there in the storm belt.

So we baited our hook, played out the line, and set to waiting.

Meanwhile, though, there was work to be done.

Two last modules were fitted to the frame of the station. We brought those down in the next flight and cocked them into place. Mike's crew began making a complete inspection of the facility, testing the equipment first on battery power, and then on the station's nuclear generator. With that powered up, we were in business.

Just as soon as everything seemed to be functioning normally, the station crew waved Callaghan and myself off. We returned to Venus Station and turned in the shuttles. For a time, we had retired from active duty as pilots. We were now Staff. Skystation staff.

The primary crew was to consist of Irene, Forsyth, myself, Callaghan, and seven technicians: two weather techs, two maintenance techs, and three practicing biologists. I didn't understand why we were going to need biologists down in that world of poisonous soup, but Forsyth and Irene seemed pleased about the makeup of the crew.

It wouldn't be the first time that this pair had hatched something in secret.

We were delivered to the Skystation in real style.

We strapped on balloon packs. And then we picked up a load of gear and prepared to depart the hold of the shuttle. This was my first adventure with a balloon pack, and I wasn't entirely sure that I was going to enjoy it.

The air pressure outside was somewhat heavier than what was normal for Earth. But the temperature was in the livable range. There was even some water vapor out there in the clouds. But it wasn't more than what you'd find in a damp sneeze and all of it was locked up in acid solutions. 'Water, water everywhere, but nary a drop to drink,' as the saying went.

Irene was the first out the hatch. She popped the release on her pack and the canopy inflated with a sharp snap. It was about five feet across and shaped like a doughnut without a hole. An acid-proof net of fibers served to contain the buoyancy pack, and a system of movable vanes provided the needed control. If it was necessary to move upwind, we had compressed gas guns to shove us along.

Nothing could go wrong as long as we were careful.

That was what they had told us in the training class, anyway. Of course, the instructors had been speaking from experience gained in a nice, safe mockup on board the Station. We'd be floating around in the real thing.

I grabbed the crate I was to transport, hooked the tether snaps into the eyelets of my safety belt, and popped

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my pack. With a rapid swoop, I was carried up and out of the hold. There was a brief instant of panic, but then I began to play with the controls of the vanes. As soon as I saw that I could guide the balloon's flight, I began to relax. It was almost fun.

We waited for the others to come out in a group, and made the crossing together. There was a large cargo carrier accompanying us. This looked something like a miniature dirigible.

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Boxes and bails were slung beneath it in a large net. Two small motors drove props and these provided the motive power. Callaghan directed the carrier with a radio control device attached to his belt.

The wind was calm, just a spring breeze in comparison to the gales that we had experienced before.

The shuttles waited until we were all in the Station lock before they went into drive and swooped away.

The lock door was huge. It had to be to allow entry while wearing balloon packs. A bar across the center of the lock was the mooring post. One by one we grabbed it, deflated our packs, and dropped to the deck, moving aside to make room for the others.

Callaghan brought the carrier in last, and I shut the outer hatch and sealed it. A quick spray of detergents and neutralizers cleansed the interior and then good air was being pumped inside. One by one we shucked off our suits and hung them up in the lockers.

"Home at last," Forsyth quipped. "There's no place like home."

A soft peal of distant thunder was his only answer.

The first task was to set up the laboratory equipment. The weather machines were already in and functioning. But the biological research devices required delicate handling. These had been saved until last.

Irene took responsibility for this. She and her three techs began unloading the carrier's cargo net while Forsyth gave Callaghan and I a tour.

The Skystation was laid out on two levels around a central hub, which was the living area. It was reasoned that the center of the station would be the safest place, and the least likely to be breached in the event of a 'blowout.'

"It's not very big," Callaghan said at last. "I was expecting something a little more expansive. This reminds me of a submarine. Except submarines have more room to move around in."

Forsyth was not disturbed.

"This is the first of a series of stations. One cannot start with everything one desires right off. We're using this design as a proving ground for later improvements. The Skystations constructed after this one will be larger. They have to be in order to be financially feasible. Skystation One is still an experiment, the first manned colony on Venus."

"The second," I corrected softly, not willing for the first futile attempt at colonization to be forgotten.

"Yes, you're quite right. I'm sorry. Roger."

We moved down a curving hall and entered a relatively large open area.

"This is the weather lab. As you can see, the computers are already operating. They feed their information into a central memory bank at Venus Station. Everything is automatic. We merely provide maintenance, and on-site experimentation. That's the main job of the weather team. That, and perfecting another important project."

He pushed aside a sliding panel and revealed another lab, this one half the size of the first.

But I recognized the device

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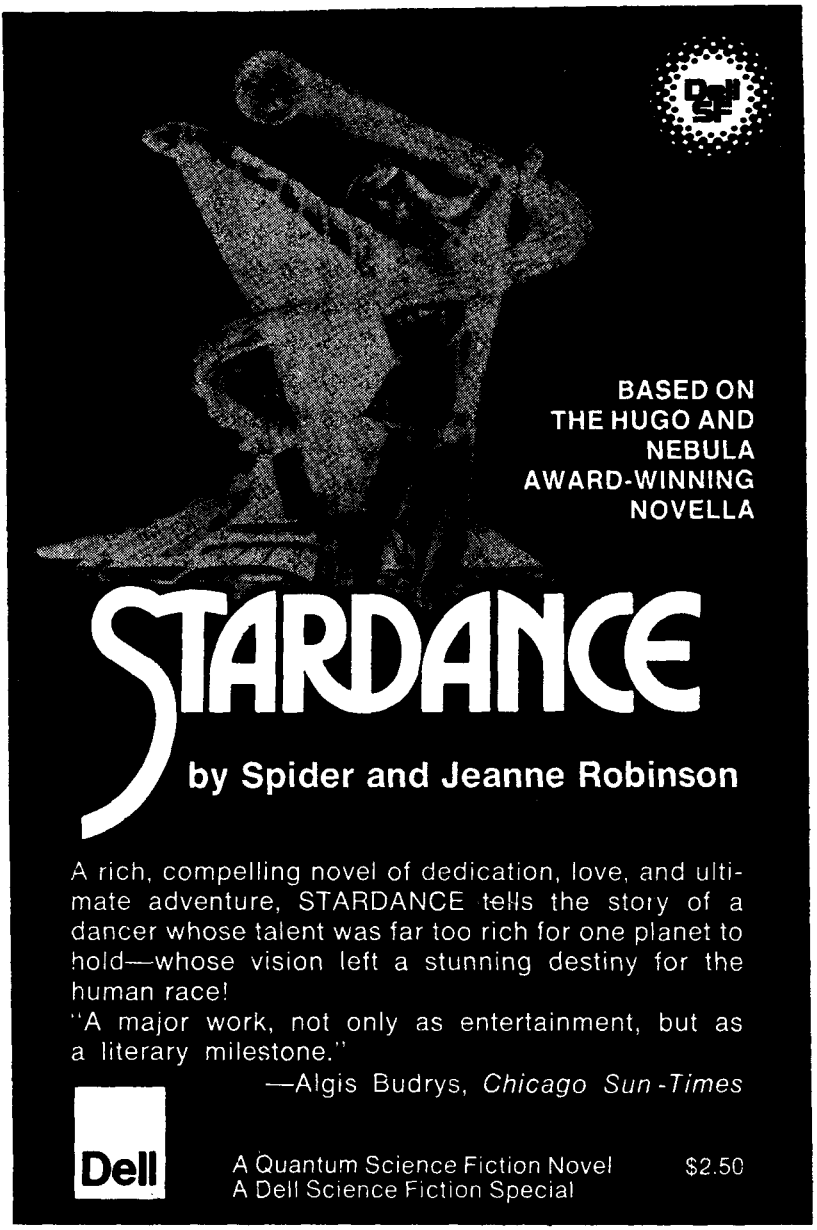
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strapped onto the table, even if it was partially disassembled.

"VACU! You haven't given up on that turkey, have you Forsyth?"

"This device may be the salvation of your children, someday. Smyth doesn't put much faith in it, but I do. And since he didn't directly tell us not to continue our work on the device once we moved into the Skystation, I decided to bring it along. What better test environment could we have found than the planet herself?"

"But how will it ever be practical? You'll need millions of the things to get an appreciable effect. Even then the process may take a thousand years."

"Who is to say that we won't have a thousand years, Roger? Can you read the future that well? And why should a project be discontinued merely because it requires a hundred, even five hundred years? That sort of thinking is an artifact of our 'get things done quick and forget them' society. Time means quality and planning. It's those things that last."

A technician interrupted us.

"Call for you, Doctor Forsyth. A shuttle is outside. They want to deliver the squid."

"Ah." Callaghan broke into a sudden grin. "It's here. Splendid."

He rushed from the room with Forsyth at his heels.

I was puzzled at their behavior, but not unhappy with finding myself alone. I took the opportunity to go hunting for Irene.

She was in the biology lab. Her techs were assembling an electron microscope kit. The heavy base had already been bolted to the deck.

"Busy, as usual, I see."

"Always. You expected to find me lolling on my bed, maybe?"

"Just hoping." I began to examine the mess piled about the lab in heaps. "What's all this?"

"Our engineering equipment. We plan on designing some new algae while we're down here. With luck, some of them may take to living on Venus."

"That's a little farfetched, isn't it? I mean the air is awful dry, even at this altitude, and what little moisture there is would etch the surface right off sheet steel."

She looked me right in the eyes and grinned.

"Yep, it's hell out there. So we're going to build tough. Tougher even than your ghetto friends. Want to help with the program? You can be our technical advisor."

"Don't get smart, Irene. I don't like that kind of talk."

I was sorry as soon as the words were out, but since I couldn't retract them, I let them be.

"Well, pardon me." Her tone was faintly snotty. "That's the other thing our algae will have to overcome... having a thin skin."

"I've got to be going," I snapped.

"So long, honey."

Back in the hall, I fumed a bit. She was intolerable. I couldn't understand what I saw in her, or why I even wanted her company. But I always seemed

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to look her up, no matter what.

Hell, women. Can't live with them, and can't live without them. Man had been saying that for centuries. But they hadn't caught on either.

The first night on the Skystation was quiet. Yes, night. A genuine period of darkness. The reason was that the station was being carried along in the cloudbanks. Day and night could have meaning again because the clouds moved so rapidly. Below, the surface was spinning much slower, and in the opposite direction. Venus is a crazy world. One would almost think that once something had smashed into her, slowing her rotation so much that she actually began to revolve in the opposite direction. One of my geology instructors had briefly mentioned some theory to that effect, but I hadn't paid much attention to it at the time.

We were organized into shifts according to day and night again, however. And my metabolism began to feel almost normal.

On the third day I got a call from Venus Station. It was Dennis. He had been contacted by the Group. Using a code we had developed privately, he revealed the details to me.

As I had suspected, the cell leader had not been satisfied with the kid's explanation. Dennis had been taken to a remote area of the Station and interviewed by his contact in the presence of another man who had worn a full shroud over his head. This second individual had never spoken in the kid's presence, and so Dennis had no idea whatsoever as to who he might be.

But the information on my past must have intrigued someone. Dennis told me to expect a message packet on the next shuttle.

We kept our talk brief. There was no point in risking alerting someone. Callaghan and I were both agreed that with all the young, unhappy technicians and students drifting about Venus Station, an outside group recruiting trouble would find a fertile body of volunteers. The entire Station might be ripe with potential bombers and hitmen. The adventure was starting to take on the unreal flavor of a holo-drama.

Spies and Spacemen go forth. It might almost have been funny if it hadn't been for certain of the characters almost getting themselves killed.

That afternoon, while Callaghan and I watched, Forsyth explained the weather station concept. His only prop was a planetary map showing a schematicized version of the cloudbanks.

"Here we are," he told us in his best classroom attitude. "Floating free in the second cloud mass. This particular bank travels slower than the upper deck, but swifter than the lowest. This is to be expected. In fact, Harbington predicted it in '98. There is a curious electrical interplay between the cloud decks. The discharges are spectacular, especially at night when darkness enhances the effects. The lightning flashes can be seen for miles, even through the thickest mists. Perhaps we can harness the energy. We are investigating releasing weather balloons

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on a regular basis since taking up residence here. Each instrument package is monitored here, and by Venus Station. Thus far, our survival rate has not been good. The lifespan of a weather balloon in the Venusian atmosphere appears to be a matter of hours. The 'why' is another question we must answer before Venus will be considered a safe bet to colonize."

"If Venus is ever safe, which I doubt, I'll be the first to buy up a million acres of real estate."

"Careful, Roger. You may be tying up more of your money than you wish."

Unruffled, Forsyth continued.

"This weather research also relates to another project which you all know is important to me. Need I say more than VACU?"

Callaghan maintained a polite silence. I groaned. It was my privilege by now. I'd known Forsyth the longest.

"Last night, I launched the first test model of a series. The results are very promising. This time, I included an automatic guidance computer and electrical and pressure sensors, each with a triple back-up. The idea of triple back-ups is not new. But my self-repair feature is. When an LSI card malfunctions it is automatically replaced from a storage unit. There are seven changes for each circuit. It's as expensive as hell, but I think it's working."

"But when the unit runs out of cards the result will be the same, down it goes into the soup."

"No, there's a separate repair facility for the LSI cards. Each chip is tested by a sensor, and if the chip reads 'bad' it is replaced. That puts the card back on line in the storage unit. I ran all this through the computer, and it gives me a theoretical lifespan for each VACU of seven years. That's more than long enough to flood the skies with the devices."

"You talk like you're going to single-handedly convert the Venusian atmosphere to an Earth normal model."

Callaghan was frowning at me warningly, but I ignored him. Forsyth was a friend of mine. I didn't want him making a fool of himself.

But the geologist was smiling.

"No, I don't expect that I will. But possibly my idea will pull off the trick, with the help of a lot of people. The chemistry is sound. I won't bore you with the formulas, but basically, the Venusian atmosphere is CO_2. That's two molecules of oxygen bound up with one of carbon. The trick is to release those bonds, setting the oxygen free, but at the same time, conserving the carbon. VACU accomplishes this by using the free electricity of the Venusian atmosphere to break the bond. It does so in such a manner that oxygen is released as a gas. The carbon, however, adheres to a plate. A crust is formed. Periodically, this crust is scraped off into a pressure container. This container is located in the center of VACU. A hydraulic press, again electrical, forces the carbon molecules together. Graphite is produced as the first stage. But as the process continues, the carbon becomes diamond hard. And that is the final result, a very pure industrial

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diamond. The creation cycle requires seven days. In the meantime, VACU had produced a great deal of oxygen.

"Unfortunately, this will not stay free very long. Instead, it will enter into other chemical reactions, oxidizing certain compounds and causing them to fall out of suspension."

"That should clear up the murk out there, in any case," Callaghan said.

"Eventually. The process will also thin out the atmosphere by oxidation. CO_2 does not bond itself to the surface. Free oxygen does, as we have discovered on Earth and Mars."

"And how long will this take?" I had already guessed the answer, but I wanted to hear it from Forsyth.

"Approximately seven thousand years to reduce the atmosphere to an Earth normal model using VACU as the single mode of transformation."

"That's a long time."

"A very long time," Forsyth agreed. "But not nearly so long as the creation of the Earth. There we are talking of a billion years, give or take a few million."

"I don't see why it can't be done," Callaghan said abruptly. "At least, I don't see why we can't try. We lose nothing if we fail, and gain a world if we should succeed."

Those words got him a clap on the back from Forsyth.

"There's a man after my own heart. I only wish our junior pilot would display such an outpouring of faith in the future."

"Maybe someday I will," I told him. "But at the moment, I'm hungry. Is the lecture over?"

"Done. Everyone retire to the mess hall. I'll meet you there later."

Callaghan and I left together.

"Did you really buy all that crud about converting the atmosphere?" I demanded when we were out of earshot of the lab.

Callaghan shrugged.

"The old man has a dream. Dreams are fragile items, but important. They give humans the will to live when they have no other reason to try. And sometimes they produce a lot of good. All great men from Columbus to Reily have had dreams. One gave us the 'New World,' the other has produced the physical principle for the interstellar drive. Someday we will have a starship because of a crazy old physicist laboring in some backwater college, shunned by the other great minds of his time because his theory of time and space didn't match the accepted version. And look what happened!

"Maybe Forsyth is the Reily of our time."

"But he's a geologist. What he's doing requires a degree in atmospherics," I protested.

Callaghan laughed as though I had said something outrageously funny.

"So, you're a disciplinarian. Well, remember this. A great idea is thirty percent hard knowledge, and forty percent imagination. And you don't need a degree to have imagination. Ford and Edison were proof of that."

"You left out thirty percent in your equation," I advised. "It won't work."

"It will work. That other thirty percent is pure sweat. And you and I, and

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the technical force of Venus Station are going to supply that to bring Forsyth's dream into reality. Providing, of course, that our luck holds. Luck is something you never put into an equation, but it's there. It can make or break you. I just hope you're superstitious. Because luck knows when you're not."

"You're crazy," I told him. "Crazy as a loon."

"Look outside, youngster, see where you are, and tell me that you're not, too."

He had a point there. I shut up.

12

The days passed swiftly, even though these periods of daylight were four times as long as Earthly days. There was much to be done, and we were short-handed. That problem was solved, however, when Irene found a way to increase the food production capacity of the hydroponic garden. She was a wonder with plants. I believe she could have induced a stone to put down roots and sprout leaves if she tried.

Anyway, Dennis, and two other techs were transferred down with their gear. And we managed to obtain another squid.

I didn't know what a squid was as yet. That revelation was due later.

My duties from the start were with the biology lab. That was fine with me, but there was one problem. My only experience with biology had been in two basic classes at the Venus Station college. Irene's work was much more sophisticated. She was working in genetic engineering. Up to that point, I had thought engineering had concerned itself with electronics, construction, and physics. How did one go about designing and fabricating a plant, or animal?

Well, that was the first step . . . school. I found myself in a class with the three other techs and Callaghan. It seemed that Callaghan and I were going to be pioneers in this new garden of life Irene was designing.

I began to long for the security of the geology lab. I understood the chemistry there.

First, she showed us around the tiny laboratory.

There was the culture shaker, with its curious 'nipple' sided flasks, and the nutrient baths. An alga culture was 'working' in this. The fluids were bubbling and brown. A conveyor screen was passing through the bath, removing thin sheets of cells which were then peeled off by an automated harvesting arm and separated into individual culture dishes for computer analysis.

The computer took up a third of the lab space. It was an ancient CYDAC IV, but suitable for Irene's needs, as she explained it. With it she could sort through 100,000 chromosomes a minute, diverting interesting material into culture tubes for further growth. It was from these 'sports' that she could select useful traits and 'marry' them to Base Stock cells.

Her second toy was another space consumer. This was the laser scalpel. Linked with an optical microscope, the scalpel allowed surgery on individual cells. It was used to carve out chromo-

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somes for detailed investigation. But even this device was too crude for most cell surgery.

DNA surgery was accomplished chemically, using selected enzymes to dissolve portions of the chain. Then, plasmids from Target cells were joined into the gaps. The completed DNA chain was then inserted into a healthy cell as a pseudonucleus. If the surgery was a success the cell lived and reproduced. Sometimes a viable Sport was produced. If the Sport lived and displayed useful traits it was cloned into a production model.

Sometimes, though, the Sport was only marginally successful. If it was judged unsalvageable, it was dumped. Even so, a certain trait, although inefficiently portrayed, might be used to complement another organism. If this was the case, the procedure was to dissolve the cell wall and fuse the protoplasts of Host and Sport. The fused cells, if they worked together, might be cloned and the strain perpetuated throughout a breeding population.

Although complicated, the procedures were actually quite simple once you got them down. By the end of that day we realized why the lab was a 'clean room.' A harmless bacterium, or virus might destroy a month's work by polluting an entire culture with undesirable traits. Even worse, a killer strain might be produced accidentally, and we in the station would have no natural immunity to it. We could be wiped out in less than a day.

Suddenly, we realized that Irene's work, as fascinating as it was, was also grimly serious. This was no game. Her Sports could be as deadly to us as refined plutonium. We couldn't allow a mistake in the biology lab, any more than we could allow carelessness in the reactor room.

Then she brought out her successes.

She was proud of them, her expression, the gentle way that she handled the cultures showed that eloquently.

I expected to see a green or brown liquid sloshing about inside each flask. But I should have known better. Irene was constructing atmospheric algae. It existed on Earth, but very few people knew about it, since it traveled as microscopic spores and would only take 'bloom' when it settled in water. A Venusian alga would always be adrift and would never find itself in the presence of free water. It would have to 'steal' its moisture from the acid droplets floating in the clouds and accumulate it micron by micron. It would have to be able to assimilate sulphur and break down chemical acids into usable solutions and compounds. Its skin, or rine would have to be a good conductor, or else the electrical potentials in the clouds would generate enough resistive heat to cook, or even explode the plants. It was a tall order. This was no simple plant, it was a miniature refinery.

I wasn't sure what to expect. What would a complex alga look like?

Irene brought out her flasks. They held clusters of brown and green marbles that rolled about in the glass containers like soft, thick-skinned balloons. Balloons? Exactly, for they had

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been designed to float in the atmosphere, hadn't they? Each was an immense, hollow cell with a tough, UV resistant epidermis. The nucleus was visible as a dark-colored lump on the lower side of the cell. Its mass served as a counterweight, for the major portion of the interior was hollow, and filled with hydrogen gas secreted by the nucleus and concentrated in an oversized vacuole. The chloroplasts were contained in the epidermis, especially on the upper hemisphere of the cell where the most intense light would be present.

Irene was like a proud mother as she showed off her creations. "I'm going to fill the clouds with these things. It won't be hard, they reproduce hourly. In time, they will filter out the sulphur particles in the clouds, and that will reduce their acidity. It will be a slow process, but not so slow that we won't notice the first effects in say, twenty years? I'm preparing a crop for release. You and Callaghan will have the honor of establishing the first true native organisms of Venus."

I wasn't thrilled. "How are we going to do that?" I wondered aloud, and with a heavy air of suspicion.

"You'll find out later," she told me mysteriously. "Just be patient."

I glanced over at Callaghan, but he just grinned nastily.

The remainder of the class consisted of a brief operating course in each of the lab machines, including the scanning microscope. At the finish, my head felt like one of the balloon alga, ready to burst from internal pressure.

It was a relief when Forsyth called the lab and informed me that a shuttle was transferring cargo. I was to meet him at the airlock.

This was a delivery of Irene's biological stock from Venus Station. Her alga had been an on-going project for some time, it seemed. While she did basic research, her results were being replicated on board Venus Station. This was where the basic stocks were manufactured. There just wasn't room for that on the Skystation.

The culture flasks were sealed into plastic cases. They came over by the hundreds on two cargo carriers. Forsyth and I stacked them in the corridors and went back for more.

Then came supplies. Dennis and some of the techs arrived to help. We labored like beasts for twenty minutes, and then the shuttles departed into the mists again.

I stood for a moment gazing out into the emptiness. The pressures were almost Earth normal. We could get by with atmosphere suits up here. They protected us from the acid clouds and provided us with breathable air. The helmet was a transparent sphere with a photo-sensitive UV shield that darkened when light levels became too intense.

Up here in the clouds, the days were almost bright. Twenty percent of the sunlight managed to find us, and sometimes the glare was like an arctic whiteout.

Below the station, emptiness churned and heaved, an insubstantial sea. Mists swept across the lower cloud deck in fragile curtains. Here, in the

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second cloud deck, we were not always closed in. The clouds had distinct breaks in them. We were drifting between massive thunderheads, with the anvils towering far above us, walls glowing with splashes of sunlight. In the darker interiors of the cloudmasses, lightning played almost constantly. Venus was alive with electrical potential caused by immense thermal activity flooding up from the superheated surface of the planet. The clouds were always in movement. We were riding an elevator of air which periodically rose and fell as it swept around and around the hidden world.

Venus, as diabolically deadly as she was, could still urge a man to reflection. There was a certain beauty to her. But it took a trained and sympathetic eye to appreciate it.

Dennis touched my suit arm and broke me from my reverie of the distant clouds.

"I was afraid you'd tumble out. Forsyth wants to close the hatch. And you have a message packet."

"A packet?" At first I didn't understand. But then Dennis gave me a sad wink.

The Group. It was my contact!

I hurried to my cabin. The packet was on the bunk, a sealed plastic envelope marked with my name.

I broke the fastener and slid the contents out.

A letter addressed to me, and a political pamphlet. The pamphlet was titled *Human Expansion and the Principle of Free Worlds.* I leafed through it and found it a dry dissertation on philosophy and world economics. The author was listed as A. Ebergill, Ph.D. An unknown, as far as I cared.

The letter was so brief as to be ridiculous.

7/4/23

Dear Mr. Teale:

Your interest is appreciated.

Enclosed is a statement of our Group's beliefs. Please read Dr. Ebergill's paper and evaluate the thoughts expressed at your leisure. The paper is cheap, however. Please do not expose unduly to UV radiation, or else it will oxidize very rapidly.

Yours in Expectation:
T.Y. Cabot

My first reaction was 'what a stupid letter.' This was the dangerous gang of agents that had attempted to kill thirty people? What utter bunk!

I sailed the pamphlet across the tiny cabin and wadded the letter into a ball, intending to toss it in the wastebasket.

I stopped, though. Might as well let Callaghan see it. He'd laugh, but he was in on this, too.

He was in his cabin dozing. He woke to groggy awareness when I tossed the balled-up note onto his chest.

"Read that."

He pulled at the wad of paper in a disgruntled way.

"Treat all your mail this way."

"Just the garbage. The note's from the Group. Who's Cabot?"

Callaghan was quiet for a moment. Then he sagged back against the pillow and closed his eyes.

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"Cabot is a wheel in the Transportation section. He handles the paperwork for the new kids that come in from Earth. Got the job six months ago on a recommendation from the Cussler Corporation. This note may or may not be from him even though the signature looks right. Can't imagine why he would use his real name."

"Maybe he thinks I know who he is, hopes his name will impress me and lend a little respectability to the cause."

"Maybe," Callaghan agreed, half asleep.

"Want to see the pamphlet? It's about human expansion and the principle of free worlds."

Callaghan made a gagging noise in his throat.

"I've read it. That piece of trash has been circulating through the convict quarters for a year. It's bunk, but it gives some of the kids the spirit to hang on from day to day. Smyth knows about it, lets Cabot pass it around just to defuse some of the tension at the station. He feels it's a safety valve."

"Oh." For some reason I found that news discouraging.

I left Callaghan to catch up on his sleep and went off to grab some lunch from Stores. While I was eating, though, the intercomm summoned me to the lab.

I took what was left of my lunch along and disposed of it in the hall. Artificially flavored protein in a tasty sauce was what the label read. It reminded me of dog food. But it was all there was to eat until Irene found a method of growing steaks in her little nursery garden of little monsters.

As I slipped through the door I was greeted by a kiss on the cheek.

"That was unexpected."

"I'm happy," she beamed at me. "Can't you tell?"

"What about?" I was becoming uncommonly wary where Irene was concerned.

"The crop arrived. And it made it safely, without losses, ready to sow. All we have to do is load the squid and take her out."

"What the hell is this squid everyone keeps talking about? A shuttle?"

"Something like that. Actually, it's more like a cargo carrier, but larger. It requires a two-man crew. We're going to keep track of our biological material with it. The vessel is much safer than a shuttle, as long as you stay away from thunderstorms."

"Lady, there ain't nothing out there but thunderstorms," I said fervently.

Some of the transport cases for the release crop were on a lab table. I pulled out a plastic bag and stared at the contents. A mass of peach-sized, brown blobs stared back. And as I watched, the things squirmed slowly.

With a snort of disgust I dropped the bag back into the container.

"Beautiful, just beautiful. When do we leave?"

"We have to wait for a lull. The quiet air will give the plants time to adjust to conditions. This crop is asexual and nonmotile. They will merely drift, forming a food crop for later, more advanced lifeforms. But because they are the base of the food pyramid, we must

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release them early to give them a chance to establish a solid foothold in the environment."

"You don't even know if they're going to establish themselves. A lot can happen out there."

"They survived quite well in the lab," Irene snapped back. "I fully expect them to survive out there."

"Okay, okay. I shouldn't be riding you, anyway."

I grabbed an armload of the cases.

"We better get these loaded if you're satisfied with them."

"I'll help," Irene insisted, and called two of the technicians away from their work to assist us.

The loading took most of an hour. In that hour I learned what a squid was. It was a bag . . . a giant balloon with a streamlined gondola suspended under it. It inflated in two separate stages. First, the gondola. Gas bags running fore and aft gave it rigidity and partial lift . . . enough for us to maneuver it out of the airlock under its own electrical power. There were small engines extended on booms amidships. Long, slow moving props stroked us through the air. It wasn't fast, but the squid was powerful. In the Venusian atmosphere, power was more important than speed.

The main gas bag inflated once we were clear of the Skystation. This would give us the lift needed to stay at selected altitudes, as well as giving some sailing ability. This would save the power in the batteries. We even had a flying jib, for speed in emergencies.

The cargo hold ran the length of the keel. It was like a bomb bay. We could release the payload all at once, or slowly, by sections.

The curious thing about the squid was that it was transparent, constructed entirely of plastic . . . inert plastic. In an acid environment like the atmosphere of Venus, this was a necessity.

Callaghan arrived midway through the loading procedure to help.

One by one, we emptied the containers of algae into the cargo hold. It was tricky, the individual plants had a tendency to drift away unless you slammed the hatch on them. As it was, a number got loose in the airlock in spite of our efforts at containment, and the chamber began to take on the appearance of a child's party. The things were bobbing all over the overhead by the time we had finished. It took a long handled net to capture them and bring them down.

Meanwhile, Irene supervised, fussing around like a mother hen with two nests, undecided about which one she wanted to sit on.

At last it was done.

Callaghan began checking over the craft. It was his design, he admitted to having perfected it on the Venus Station Engineering computer. The Big Beast made design models more practical since the need for test models was eliminated. Computer simulations could be made to perform normally under any condition the engineer could provide data on.

Irene and I went off to the galley to prepare food packets. It might be a long trip.

She was abnormally friendly, even to the point of snuggling up under my arm

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BIOLOG

by Jay Kay Klein

In Thomas A. Easton's case, it all started with a porn novel sold nine years ago while at the University of Chicago completing a Ph.D. in theoretical biology. He figured standards were so low, he was bound to sell. Since then, he has worked his way up to science fiction, with a first story sale in 1974 and a first Analog appearance in the December, 1974 issue with a "probability zero" type of article.

Subsequent to novels written under Penelope Pendergast and other pen names, last year Tom was able to use his own name as senior author of a college biology text, Bioscope. The advance for this permitted him to leave his job in Chicago as a science editor with a book publisher and become a full-time writer. Even better, his wife and he could go back to their native Maine, where they now reside in Belfast. Although he has lived in Rhode Island, Maryland, Illinois, and nearly two years in France, he feels most at home on the coast of Penobscot Bay.

Tom's B.A. in biology comes from Colby College, in Maine. One undergraduate summer was spent in Los Angeles taking courses in Space Biology at the University of California. He is fluent in French, and can manage Russian well enough to have sold a translation of a Soviet scientific work to the MIT Press. He teaches part-time at Maine's Unity College.

Since last year, Tom has been one of Analog's alternating book reviewers, succeeding among others Algis Budrys, who had helped him learn the craft of story writing when they lived nearby in Evanston, Illinois. Several of Tom's fact articles and two pieces of full-fledged fiction have already appeared in Analog, and more are in the works.

Thomas A. Easton

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and squeezing me when we had finished making the selections from the freezing unit.

"How long have you had this problblem?" I asked, enfolding her in my arms.

"Since I met you." Her eyes were glued on mine.

This was just a little sudden, I thought. She certainly hadn't been this affectionate on previous occasions. Bitchy was more the description. She must want something, I decided.

But she would reveal it in her own time. If I should ask just what the heck she was trying to worm out of me the mood would be blown, and she would get mad as hell and flounce off in a tiff.

So, like a patient gentleman, I let her play out her game and enjoyed the attention while she set her trap.

Finally, it came. It was one of those proverbial bolts from the blue.

"I love you," she said, straight-faced.

"What?"

"I love you." As if to prove it, she kissed me, long and slow.

"Okay, I believe you. Want to tell me about this sudden change?"

"Not yet. Let's not rush things. Go sow my algae. Then we'll talk."

"You're crazy, you know that."

"Of course. Why else would you be in love with me."

That seemed to settle the issue as far as she was concerned. She wished me a safe trip and helped carry the food down to the airlock.

Ten minutes later, Callaghan and I cast off into the clouds, leaving the Skystation behind us. It drifted astern, a small point of safety in a chaotic sky.

Callaghan brought me forward and showed me how to steer the squid. The reason for the name escaped me. The only thing that looked like a cephalopod was the transparent gondola, and then you had to stretch your imagination a lot.

Guiding the craft was a breeze, however. It jumped along through the air like a frisky pony, shuddering a bit in crossbreezes, but holding well to the reins. There wasn't a wheel, or a rudder pedal, just seven guidelines running up to the bow through cable troughs. Callaghan sat well forward, strapped into a cup-shaped seat, the lines played through his fingers.

My work station was in the stern. That was mostly for the sake of balance, but the controls for the cargo hold hatch releases were there, and so that was where I stayed once the flying lessons were over with.

We were to take the squid ten miles ahead of the Skystation, release the algae crop, and then tack upwind and rejoin the others. The algae would disperse, and eventually the station would catch up to the crop. That might take days, or weeks, Irene wasn't sure about the timetable. But it would be important to take a census on survival of the crop.

The big balloon cracked in the wind like a sail spilling air as Callaghan brought us about.

"Start your drop," he told me over the suit radio. "We're in position."

"Roger."

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I opened the first door and sent a quarter of the crop bounding out into emptiness. The mists were pressing close to the gondola, and had been almost as soon as we had left the Skystation. It was like being lost in a dry fog, or a dust storm. The brownish balloons of the crop bobbled up the sides of the gondola and vanished into the murk overhead.

One by one, at ten-minute intervals, I worked the hatch doors and spilled the load. At last, we were empty. Two stubborn plants were still bouncing around in the hold, trapped. I yanked open the loading hatch in the grilled deck, seized them in my gloves and tossed them out.

The wind caught them and tumbled them off into the distance.

"Crop sowed, Callaghan. Let's go home. I'm tired of playing farmer."

"Right."

The pea soup closed in even tighter on the trip back. But the station was sending us a homing beam, and Callaghan rode it like a pro all the way to the airlock hatch.

It was a piece of cake.

When we finished stowing the squid I took Callaghan up to my cabin to show him the letter and pamphlet from the Group.

Once there, I got a surprise. My cabin had been taken over. Irene, as good as her word, had moved her stuff in with me. I guess that made it official. A few papers filed with the Foundation would make the joining legal.

Callaghan heartily congratulated me on my excellent taste in women.

"Hell, she's the only one here, what choice?"

When she started to pout, I gave her a hug.

"Later," I whispered in her ear, "I'll show you how happy I am that you picked me. Thanks, lover."

"Don't mention it."

She flopped on the bunk and began to write a report for Venus Station.

I handed the packet to Callaghan and we sat down at the tiny work table.

He leafed through the pamphlet rapidly.

"This is a bunch of double-talk. A child could have put together a more logical premise. What utter rot!"

"The letter isn't much better. I've a mind to chew out Dennis for falling in with such a gang of fools."

Callaghan scanned the letter and shook his head in disgust.

"Putting this junk under a UV source is the best thing for it. Might as well throw it away. We've hit a dead end. I guess they didn't buy Dennis' story about you wanting to join up. We'll have to try something else."

"Could I see that?"

It was Irene.

I threw the booklet to her with the letter folded inside.

"Just don't let it rot your mind. It's terrible."

I turned my attention back to Callaghan.

"If they're suspicious, we'd better keep Dennis away from them. They might try to kill him. Also, we'd better go over the supplies with a metal detec-

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tor before accepting them into the station. We might unknowingly import a bomb. They tried that once before, remember."

Callaghan nodded.

We were quiet for a while, thinking. Irene rustled about on the bunk. I glanced at her and saw her shining a flashlight on the booklet. She was writing on the back of the letter and smiling.

Callaghan asked me when I would be going up to Venus Station again.

"Maybe next month."

"You could try to arrange another meeting with the Group."

"I don't see how I could make contact. They're sure to change the pick-up locations now that Dennis has been discovered."

"They won't," Irene said smugly. "They'll be waiting for an answer from you."

"And how do you know that?" I demanded.

"Just read your letter." She handed it over and grinned. On the back of the paper she had scrawled:

> Teale:
>
> VACU must not succeed. You know why. Food container marked with XR. Plant inside next device to be released. Reply 1-39 earliest convenience.
>
> Don't fail. Great rewards for success.
>
> Failure means death.

"Where the hell did you find this?" She laughed.

"Just look." She bent over the table and played the flashlight on the paper of the pamphlet. "I use this UV lamp to check cultures. The plants can't be too sensitive to ultraviolet light; if they are, outside conditions will kill them.

"But the letter was just too emphatic about not shining UV on the paper. So I tried it. Look what showed up."

As the beam played across the printed words, underlinings began to appear. Someone had marked certain letters with a transparent dye pencil. Letter by letter I picked out the same message that Irene had discovered.

"You're a genius," I crowed.

"Just a woman," she answered smugly. "Now you know where you'd be without me."

"I'm going to find out what's in that food container." Callaghan had a grim tone in his voice. "I'm afraid it's some kind of bomb."

"Forsyth should be informed," I told him. "Show him the letter."

"Will do."

He left in a rush, and Irene and I found ourselves alone.

We made the best of it.

The food container did not hold a bomb, contrary to expectations. Instead, someone had inserted a very compact radio transceiver between two packaged slabs of syntho-beef.

"This is to go into VACU?" Forsyth asked wonderingly. "I can't begin to imagine why."

"Is it possible that the bomb has already been planted? Your assembly takes place up on Venus Station. The

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manufacturing facility has a lot of techs. Any number of them could be Group members."

Forsyth stared at me. The thought hadn't occurred to him.

"You could be right, Roger. Let me check."

We followed him into the tiny lab. Another of the conversion machines was resting on an inspection pad, its hull opened for final programming and checkout.

"This will take time," he told us over his shoulder. "It may be dangerous, as well."

"Then be careful," Irene urged him. "We can't replace you if you should blow yourself up."

He laughed. "Oh, I won't do that. Just let me get my probes."

One by one, Forsyth removed LSI cards and ran them through an X-ray machine. Fifteen minutes passed. Then twenty. Nothing was found.

He started on the power supply, pulling and inspecting components.

"This seems to be a false alarm," Callaghan said after an hour's futile searching. "The transceiver must do something else. Maybe all the Group wants is a location for each device. Possibly they're going to launch homing missiles that will ride a beam in."

"Wait!" Forsyth had a note of triumph in his voice.

"Here it is. A phony can. This isn't a capacitor. The weight and mass are right, but nothing else is." He placed it in the X-ray chamber. We gathered around the screen.

"That's a receiver at the top of the can." Irene poked at the glass with a finger. "And this solid mass under it must be plastic explosive. Not much, not enough to blow the device apart, but certainly enough to cause it to cease functioning. I wonder how many others have this can built into them?"

Forsyth was staring at the bomb in disgust. "This is criminal."

"Man is his own worst enemy, Doctor." Callaghan switched off the X-ray machine and seized the bomb. "I'm going to dump this overboard."

I grabbed his shoulder.

"This is a challenge from the Group. If VACU doesn't fail, they'll know I'm not a legitimate volunteer."

Forsyth looked unhappy.

"This puts us into something of a dilemma. I can't very well allow you to blow up my machine. These things aren't cheap."

"Of course you can't. But why can't you build in an interrupt circuit that will shut down VACU when it receives the 'destruct' signal. After a suitable passage of time, the device can switch itself back on again. Let them think that you've perfected that self-repair function. That will get them worried."

Forsyth considered that.

"Yes, and I think I can see another advantage. We know where the bombs are being planted, and the Group doesn't know that we know. That means they'll keep on doing things the old way and we'll just keep on installing the countermeasure and saving ourselves time and money in the long run. How far up the chain of command do you think you'll be able to infiltrate

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the cell? They must have safeguards."

"Classically, a cell is a triad. Each member knows the other, but only the man at the top knows a member of the next highest cell. So, I don't know how far I'll get. Maybe I'll have to develop some important information that only the top boy should hear. That might get me through some barriers."

"It might also get you killed, Roger," Irene snapped at me.

"Living on Venus might get me killed, too. I can't let vague fears of retribution stop me from trying to root out a gang of murderers. They're trying to stop us from fulfilling your dream, as well as Forsyth's. I won't let that happen."

Callaghan butted in at that moment with a pertinent question.

He was still holding the bomb.

"What do I do with this?" he demanded. "It's liable to hatch like an egg while we're here arguing about it. And there ain't no chicken about to come out of this thing!"

"I'll need the receiver unit," Forsyth told him. "We'll have to take it apart. Once we have the specifications, we can build more and just throw the other bombs away once we find them."

"Okay," I said. "That finishes it. Meeting adjourned."

"Not quite," Irene was pointing to the doorway. Dennis was standing in the entry with a package in his arms.

"I'm to plant this in the reactor room," he told us, his face the same shade of gray as the walls. "And ride back with the next supply shuttle. I'm supposed to say I'm sick."

"Oh hell," Callaghan kicked at a lab table and rattled VACU against its clamps.

13

It appeared that our mysterious an-

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tagonists were determined to play both ends against the middle.

I studied the letter that Dennis had received. This one didn't play games with dumb literature and black lights. It came right to the point. He had only once chance to save his life. He was to blow up the Skystation. It gave him an out for survival, but somehow, I was sure that someone on the shuttle that was to take our ailing bomber back up to the safety of Venus Station would make sure that the youngster would have an accident before disembarking.

The game was getting serious. We had to find out who we were competing against, and fast.

"I'd better radio Smyth," Forsyth said. "He should know about this."

"How do we know that he doesn't already," I asked.

Forsyth and Irene were shocked.

"Are you suggesting that Smyth would be any part of a plot against the Sayre Foundation? The very idea is ridiculous."

"So are bombs in the reactor room," I growled back at them. "And bombs anywhere, for that matter. What I'm suggesting is that we can't afford to trust anyone at this stage. Why, those techs we have on board may be reporting back to this hidden group. As long as we're in the dark as to their motivations and membership we can trust only ourselves.

"Since this letter to Dennis was in plain language, we're going to act as though we discovered it, and the bomb. Dennis and the bomb are both going to be tossed out the airlock, with members of the crew as eyewitnesses."

"That's inhuman," Irene protested. "Dennis is your friend, he trusted you."

"And he's going to have to trust me some more. When we toss his young body out we're going to provide him with a balloon pack, superficially to prolong his agony. But in reality, it will be to keep him in the air long enough for Callaghan here to pick him up later in a squid. After a few days of hiding we can try to smuggle him on board a shuttle. You're going to have to return those culture containers. We'll just put Dennis in with them. Afterwards, when he's back at Venus Station, he'll just have to keep out of sight."

"Could I say something, please?"

Dennis had been fidgeting uneasily. Now he spoke up.

"You've been speaking of trust. There's no reason for you to do this, but I'm going to ask it anyway. I want you to trust me, to let me help."

"Help how?" I snapped.

"I have some information. Once you hear it you might consider helping me get back to Earth."

"Yes, I suppose you'd like that, wouldn't you?"

Irene cut me off.

"Will you let the boy talk and stop making an ass of yourself!"

"What is it you want to say, Dennis?" Callaghan growled.

Dennis began hesitantly.

"I've been in communication with a couple of old friends from my class in college. They're still up at Venus Station. Last week they mentioned that they had been contacted by a represen-

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tative of an organization calling itself the Group. They played along for awhile, but then things began to get rough. They were ordered to have 'accidents' and bog down operations any way they could. Now, they're getting scared because they can't get out."

"That's unfortunate," I said, ignoring Irene's dirty look. "What does it have to do with you?"

"They wrote because they knew about my situation, hoping probably that I could give them some assistance." Dennis shrugged helplessly. "But I'm as much a pawn as they are. No one escapes from the Group. Those who have left are no longer alive. The Group is easy to join, and damned hard to get out of with a whole skin. I know that if you don't kill me, the Group will. And I'm not so much a coward that I want to die without making someone work at it. I want to go back to Earth. I want a chance to dig out the Group and expose it for what it is."

Callaghan was rubbing his chin thoughtfully.

"Do you have any leads, kid?"

Dennis' eyes lit with animation.

"Maybe. But I need to check it out. It's just a shred of information about a corporation on Earth. Will you gamble on me?"

Irene answered for us. She wanted to gamble.

I sighed. But if the truth be known, I was relieved.

"Okay, let's get to work, we've an execution to preside over."

Everything went as planned. Dennis even screamed convincingly as we dumped him over the hatch rim and let him fall away into the clouds. One of the techs passed out and I was suddenly very unpopular among the crew.

But there were no more bombs smuggled aboard.

A month went by.

Then, I got a message packet. At first reading, it was just a flyer for laboratory materials. But hidden in the advertising jargon was the code I was searching for. Dennis was on his way to Luna. He was riding under a phony name, with a phony identity. The boy was safe. No one suspected.

Dennis Parris was dead. But in six months he would be walking the streets of New York. I still had some friends there. Powerful friends. I had told him to look them up and fill them in on our situation.

Help sometimes comes in strange packages.

Later that week we launched the next VACU. Forsyth had made his modifications and sent it off as though nothing was wrong. The launch was perfect, and the device went humming off on its own independent course, sucking air and making diamonds the hard way. A cloud of precipitation followed in its wake. It was a fallout of fresh air, something rare on Venus.

Two days later VACU stopped working.

And in the next load of mail delivered by the weekly supply shuttle I got a radiogram.

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No more games. I was one of the Big Kids, now. My gram was in plain talk, just like Dennis' 'death notice.'

It read:

Good work, Teale.

I am very pleased with your work. Loyalty is something to be honored and rewarded. You will be hearing from me in the future as our organization grows.

It was an interesting response ...both encouraging and anonymous. But no reference to future activities. The Group was being most cautious.

I wondered how Dennis was getting along. Had he managed to get in touch with my friends? Or had the Group blocked him before he had even gotten started? That was possible. It was an extremely confident organization, as well as being deadly and efficient.

But there was more to worry about than the Group. It was time for Callaghan and me to sow another crop.

Our ride was bumpier this time. Weather prediction was still lousy and a gale blew up while we were on the run. We were carried off course and found ourselves riding before the wind. I dumped the load of algae as a safety measure. I doubted that it really mattered where we did our sowing for this was the third crop to be released and Irene had yet to pick up a trace on any of the plants. They were all gone, swallowed up in the immensity of the Venusian atmosphere.

It wouldn't have done any good to voice my suspicions to her, but by that time I was certain they were all dead.

It was a rough sky, rough for everyone.

You couldn't forget that...Venus wouldn't let you.

Lightning flashed across our bow and the clouds lit up with electric blue highlights.

"I think we're in for a bad time, Roger."

"Can you hear the station?"

"We're on the beam. But the squid is downwind. Since we're both floating free, there's a drift figure to calculate. I wish we had some visibility."

"Can I help?"

"No, not really. We'll just have to ride this out and hope things are calmer in the morning."

We bounded on, shoved back and forth by violent gusts of wind; hammered at by long drum rolls of thunder, and savage lashings of sheet lightning.

I checked my suit gauges. We had air enough for ten hours of flight time. Dawn was seventeen hours away. Callaghan wasn't waiting for morning, he was stalling for time. Things were more serious than he had let on.

The darkness grew more intense. We were wrapped in a dense cloud cover. The wind grew less violent. But the lightning was worse. It was below us. The clouds would light up in such a manner that it seemed that we were riding a translucent sea of turquoise milk that heaved and shook under us.

An hour passed.

And then another. Things were no

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2112 a calendar of upcoming events log

5 APRIL
URCON II (Upstate NY area SF conference) at University of Rochester, Rochester, N.Y. Guest of Honor—Frederik Pohl. Registration $4 until 25 March, $5 at the door. Info: URcon II, Box 6647, Rochester NY 14627.

14-16 APRIL
International Conference on Acoustics, Speech and Signal Processing (IEEE) at Denver, Colo. Info: J.E. Ashley, Dept. of Elec. Eng., Univ. of Colorado, 1100 14th Street, Denver CO 80202.

16-20 APRIL
Popular Culture Association Meeting at the Raddison-Cadillac Hotel, Detroit, Mich. There will be a section on SF/Fantasy—Mechanizing Mamma (and other things): The Machine as Symbol and Metaphor in SF. Info: Thomas P. Dunn and Richard D. Erlich, English Department, Miami University-Hamilton, 1601 Peck Boulevard, Hamilton OH 45011.

21-24 APRIL
General Meeting of the American Physical Society at Washington, D.C. Info: APS, 335 East 45th Street, New York, NY 10017.

25-27 APRIL
TORQUE (Toronto SF conference) at Roehampton Place, Toronto, Ontario. Guests of Honor—Wilson Tucker, Phyllis Gotlieb, Chandler Davis. Fanzine artists show. Registration $7 in advance, $8 at the door. Info: Torque, 1600a Bloor Street West, Toronto, Ontario, Canada.

1 MAY
Deadline for entries in the Science Fiction and Fantasy Art Show (sponsored by the West Coast Comic Club) at the Mall of Orange, 2200 N. Tustin Ave., Orange, Calif. Info: 420 West 4th St., San Dimas CA 91773.

29 AUGUST—SEPTEMBER
NOREASCON TWO (38th World Science Fiction Convention) at Sheraton-Boston Hotel and Hynes Civic Auditorium, Boston, MA. Guests of Honor—Kate Wilhelm and Damon Knight, Fan Guest of Honor—Bruce Pelz, Toastmaster—Bob Silverberg. Registration $30 until 1 July, nonattending membership $8 at all times. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Noreascon 2, P.O. Box 46, MIT Branch Post Office, Cambridge MA 02139.

ANTHONY LEWIS

Items for the Calendar should be sent to the Editorial Offices, **four months** *in advance of the issue in which you want the item to appear.*

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better. Callaghan was straining to pick up the station beacon, now. There must be miles between us. But he just couldn't overcome the wind that was carrying us along. It was an invisible river that had forked. One branch carried the station. The other held us in its grip.

Thunder muttered again.

A blue glow appeared on the tether lines of the balloon canopy. It danced up and down the cables like a ghostly wraith, twining and twisting upon itself as it moved.

Then the glow spread to the plastic sheeting that enclosed the gondola.

"Callaghan, what the hell is that? What's going on?"

"Relax. It's St. Elmo's fire, an electrical discharge. The atmosphere is pretty exotic. It gives rise to some interesting electrical phenomena. Just stay calm and admire the view."

Some view! The fire stayed with us. Sometimes it was on the balloon canopy, and sometimes it was right in the gondola with us, chasing itself across the plastic struts. Why did it like plastic? I had no idea.

Then water droplets began to appear. Just a fine beading, at first. But soon the entire exterior of the gondola was streaked with trickles of acid. It discouraged the fire. The glow stayed up in the balloon tethers, after that.

Callaghan played out the flying jib in a last desperate effort to bring us south. But all the jib did was make us go faster. Thunder boomed above us and the clouds below glimmered in an echo of the noise.

Something splattered against the forward canopy and blew up with an orange flash.

Callaghan cursed and almost dropped the guidelines.

"What the hell was that?" I called.

"You tell me. I'm busy."

Then something hit one of the slowly whirling props. Another drifting past: a small sphere. And then another. Hell, there were hundreds of them.

Then it came to me.

"Irene's plants," I yelled at Callaghan. "We're in an algae field. They've gone deep, where there's more water vapor. They blow up when the cell vacuoles are disrupted and floatation hydrogen combines with stores of waste oxygen."

"How do I get out of them?"

"Go up! Grab some altitude!"

The plants continued to smack against the thin hull as we clawed our slow way out of the field. Once, the St. Elmo's fire got too close to a cluster of the plants, and a multiple explosion took place. It was like an atomic reaction popping through the night as one by one the hand-sized plants exploded into charred ruin. The red glow disappeared beneath us finally, and flickered out.

"Hairy," Callaghan breathed, playing the jib out into the wind.

I was too shook up to agree. There was still a lot of night before us, and we still had to find the Skystation.

But Irene would be happy to hear that her plants had survived.

If we survived to tell her.

TO BE CONTINUED

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PRUDENCE

The Alternate View by **Jerry Pournelle**

They can't find the solar neutrinos. I suppose every Analog reader knows about the big experiments at the old Homestake Mine, so I needn't review them here, nor have I anything to add. Nothing has changed: by every theory we have, the Homestake experiment ought to be finding solar neutrinos—but there aren't any. Some theorists have suggested, whimsically, that "the sun has gone out."

Maybe it has.

Having intrigued you with that, let me turn to Harry Stine's riposte of last issue. According to Harry, "The Great Aerospace-Political Machine" has lost the game—and still hasn't got the message. In his view we'll go to space if and only if we "convince the entrepreneurs that there is a big buck to be made out in space."

Boy, I hope so. But I have me doubts.

And what has all this to do with solar neutrinos?

Prudence, according to my American Heritage Dictionary "implies not only caution but the capacity for judging in advance the probable results of one's actions." To be prudent is "to exercise good judgment or common sense," and "to be careful in regard to one's interests; to be provident." In Catholic philosophy prudence is a "cardinal" virtue—that is, one whose desirability can be deduced from reason. A prudent person is one who plans ahead.

Now that matter of the solar neutrinos wouldn't be so disturbing if there were not other data. For example: on April 9, 1567, Christopher Clavius observed a total eclipse and described it so vividly that few doubt he saw what he said he saw—and what he saw was an "annular eclipse," one in which the rim of the sun projects around the moon. I'm told by those who've seen one that it's a glorious sight. It's also very rare, because not only must you be in the path of totality, but also the moon has to be just far enough away; and what's disturbing is that Clavius could have seen an annular eclipse on that day only if the sun were larger then than now.

Well, all right, so Clavius told stories. Maybe. Except that the official observatories in Britain and the U.S. (Greenwich and the Naval Observatory) report that the sun has shrunk by a full arc second in the last century—a rate of about five feet an hour.

Is this cyclic, or is the sun wandering off the main sequence? No one knows. The best guess is that it's cyclic. One supposes that the absence of solar neutrinos may also be cyclic.

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And, after all, gravity is a powerful energy storage device; the sun will shine on from gravitational collapse long after the thermonuclear fires have gone out in his core. Maybe there have been lots of cycles like that: the sun goes out, begins to collapse, and the heat of collapse restarts it; the resulting pressure from inside halts the collapse.

But those cycles should have an effect on Earth. Why haven't we seen it in history?

Ah, but we have seen one such effect. The Ice Ages are periodic, cyclic if you will, and by pure statistical projection we're due for another: for several million years the "normal" pattern for Earth has been Ice Ages of about 100 thousand years, with brief (15,000 year) interruptions of warmer climates. The last full Ice Age ended about 15,000 years ago...

Well, O.K., maybe it's going to get cold in a couple of centuries. Seems warm enough now. Worst that can happen is that it gets progressively colder, but we ought to have plenty of warning.

Nope. That is: we certainly have no more than a century of warning; that's how long it took to cover Britain with ice. Now it looks to be more like twenty years, according to Genevieve Woillard of the Catholic University of Louvain. She has been collecting samples from lake bottoms in Northeast France. The samples have layers of pollen deposits something like tree rings. Her study showed that the region went from temperate forest to taiga in fewer than 150 years last time; and that might not be so scary except that further analysis shows transitions from "colder winters" to ice in *twenty* years. Other studies have shown that it took *considerably* less than one hundred years for glaciers to form all over Britain.

During the American Revolution, Alexander Hamilton brought cannon to General Washington on Manhattan Island by dragging them across the ice on the Hudson River. In those days the growing season was a full month shorter than now. Of course things have warmed up since then—

But we had the Great Freeze of 1976-77, and the Big Freeze of '77-'78, and the "severe winter" of '78-'79. I'm writing this in November of '79; let's hope that by the time you read it we won't be in the "Great Chill" of '79-'80...

O.K., Pournelle, what's the point of all this? Trying to scare the readers? Do you really believe that the Ice Ages are coming right now, in your lifetime?

What do you mean by "believe?" Like most people, if I have to bet everything on one prediction, I'll have to predict that things will tend to be as they have been; but the whole point of prudence is to take forethought; in the words of the Scout Motto, to "Be Prepared."

Item: I don't really believe the economy is going to collapse, or that someone will be insane enough to trigger a thermonuclear war; but I'd have to be totally out of my mind not to have made preparations. Survival

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planning has become a fairly large business nowadays, and rightly so; and I've made my preparations, some of which were described in *Lucifer's Hammer.* I've not gone as far as some of my comrades, but I've stashed certain supplies. I drive an all-terrain vehicle. We've organized a survival group and we have a retreat, and we've seen to it that everyone including families knows where to go in the very unlikely event that we've got to flee without warning—and as I said, that's fairly tame compared to the preparations some have made. Query: am I foolish for wasting effort in making survival plans—or foolish for not having gone far enough with them?

But that's individual survival planning, and at best our chances are problematical if things come apart. In truth, the *best* way we could assure survival is to see that there's no collapse; no "Coming Dark Age" as Roberto Vacca put it in his must-read book. Only—how can I, as an individual, stave off the collapse of civilization? What can I do about an Ice Age, or for that matter, about inflation and energy shortages and lowered productivity and...

Not a very great deal. Not alone. I'm hardly the first to recognize that.

"...among these rights are life, liberty, and the pursuit of happiness. To secure these rights, governments are instituted among men...." Thus Jefferson phrased the distilled wisdom of one of the most remarkable collections of men in history. Understand that they were no more enamoured of Big Government than Harry Stine or I. They were brought up on Adam Smith, and they believed firmly that "each man is the best judge of his own interest." Franklin said of government that like fire, it is a dangerous tool and a fearful master; and he but echoed the sentiments of the age.

They also understood that like fire, government is necessary. Adam Smith himself said that one proper activity of government is those enterprises which greatly benefit all, but which are too expensive for individuals.

The Framers were not too proud to think the Erie Canal and the Lewis and Clark expedition proper activities of government. I suggest that preparing for planetwide disasters is another.

Now I agree with Harry that there is a big buck to be made in space. I agree with David Friedman and some of the other extreme libertarians: given a long enough time period, private enterprise will build space industries. But is it prudent to wait?

Consider. There is a small but quite real possibility that we are even now descending into an Ice Age; that by the year 2000 we'll see the ice across the north. With enough activity in space we could do something about that. Tuning Earth's climate is no easy task, but it can be done; we don't *have* to sit back and take what Nature dishes out; but that is a *big* job, the consequences affect all of us, and I think of nothing more needful of planning and regulation.

There is also a very real chance that

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Vacca is right: we are moving inevitably into a Dark Age. Add to that the ascendency of Suslov—known as "the last Communist"—in the Soviet Union. Add also their missile force, far larger than ours and *accelerating* in its growth. Add the weakness of the dollar and our dependence on foreign oil and...

Survival planning may be a bit large to leave to business.

Not long ago I spoke at a conference. The big attraction was a debate between Arthur Laffer, a rising young economist beloved of conservatives, and John Kenneth Galbraith, certainly the most distinguished economist of the liberal persuasion. Each talked for about ninety minutes. Each discussed the amazing economic growth of the 60's in contrast with the stagnation of the 70's.

Neither so much as mentioned the words "space," "research," "technology," "engineering," "invention"...

Yet one wonders if the boom of the 60's was not in part connected to the space program; to the frantic research and development of the time; to high technology developments, with the space program as the cutting edge and driving force.

But that was government, and that game, we are told, is over. Now we must persuade the entrepreneurs to take us to space. The government won't do it.

A Chicago bank officer friend once did some simple research. He was looking for private capital for space development, and had access to all corporation records. He was searching for companies with cash flows of $1 billion a year or more (smaller wouldn't have significant capital to invest), involved in *some* way with technology (that is, not insurance companies), and with a board of directors of average age sixty or less (there won't be much profit from space for ten to fifteen years, and we hardly expect people to vote for projects they won't live to see mature). Those aren't terribly restrictive criteria —but out of that sieve fell one and only one company. Exxon.

The best estimate for Solar Power Satellites is that we must spend $80 billion or more before we get one cent of profit, one erg of energy beamed down to Earth. An $80 billion front end cost is pretty restrictive for any company or consortium of companies. But it's only $320 each for every man, woman, and child in the U.S....

I have elsewhere argued that space is the last best hope of Earth; that we can put our polluting industries in space; from space we can extract energy; with space facilities we can adjust the heat balance of the Earth, fine tune our climate.

And once we are dispersed through space—once we cease to dwell on "Only One Earth"—once we live in our natural home, the entire solar system of nine planets, thirty-six moons, a million asteroids....Once all that is done, we shall have assured our survival as a species.

Will anything less do it?

Make no mistake, going to space is

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a large enterprise; indeed, larger than anything humanity has ever done. The only thing ever to come close in size and difficulty of task was—Project Apollo, unprecedented in all human history. Think about it. Mankind has no record of great works—other than war. D-Day was the most complex activity in history; yet it was a pale shadow compared to Apollo.

NASA may be "a Washington bureaucracy," but by God they can be proud; they did what no one had ever done, on a scale unimaginable; they managed hundreds of thousands of people working on thousands of jobs in hundreds of locations, and all that came together one afternoon at Canaveral. While they worked, the economy boomed. Although we were burdened with the Viet Nam war and the Great Society, productivity was high, and inflation below five percent. Our balance of payments showed a surplus, largely due to export of high technology.

Just now we have the resources. We have the management capability. We have the technical talent. We need only a means of getting it done; marching orders, so to speak. Perhaps we must wait for industry. Perhaps Harry is right when he says the public is no longer interested in space; that we can't play the government game any longer. Perhaps.

But the purpose of government is to act prudently for all of us. Prudence demands that we worry about solar neutrinos, and the shrinking sun, and the chances of being hit by comets and meteors, and...

Perhaps we would be better off entrusting the survival of the human race to "the invisible hand." And perhaps we would have been better off, faced with Pearl Harbor, to entrust the war to the actions of private citizens; the one proposition makes as much sense to me as the other.

But I for one agree with Franklin: government, like fire, is a dangerous tool and a fearful master—but we're worse off without it. Prudence dictates that I make some plans for individual survival in the event that our society collapses; and I do that; but it is even more prudent to do what one can to assure the survival of our society. If "The Great Aerospace-Political Game" is over because "people such as Dr. W. Walter Menninger, Kurt Vonnegut Jr., Gloria Steinem, Ira Magaziner, and Dr. Ralph Abernathy began to ask embarrassing questions such as 'who's making a buck out of Apollo other than a bunch of guys who've been doing this as a favorite hobby?' ", then in my judgment we'd better answer their questions and restart the game. To admit otherwise is to throw us all on our own resources in a universe that doesn't particularly like us.

The Panama Canal was a spectacular success in an era of success. The space program was a spectacular success in an era of spectacular failures. Both cost about five percent of the national budget for a decade. For comparable amounts we could "secure these rights" for the lot of us.

What else is government for? ■

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BOB SHORE

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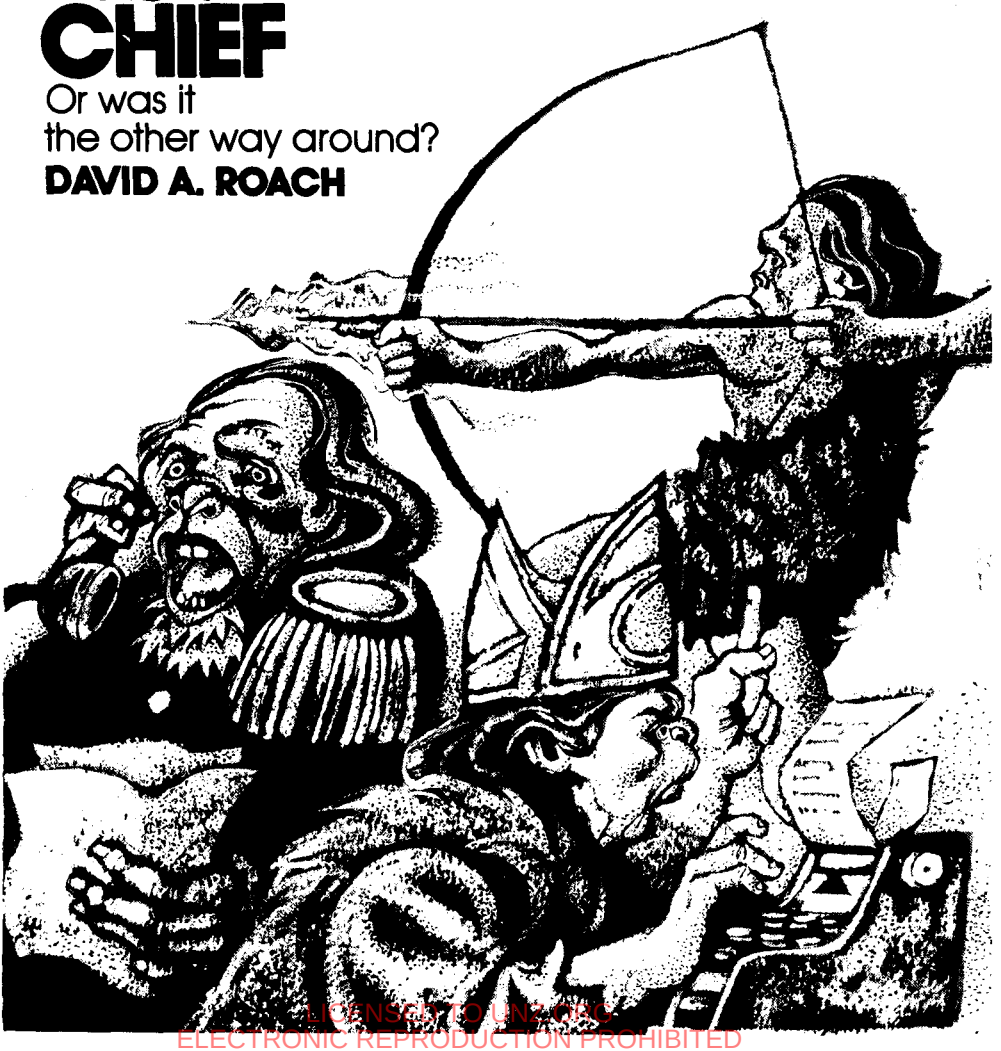
MEMO FROM THE BIG CHIEF

In the beginning man invented technology, and then bureaucracy grew up to control it.

Or was it the other way around?

DAVID A. ROACH



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OFFICE OF THE BIG CHIEF
OF THE LITTLE CAVE BY THE
BIG CREEK NEAR THE WIDE RIVER
3rd Day, 2nd Moon
Since Spring Thaw

TO: Dr. Wugg, Ph.D.
Chairman, Department
of Research Funding &
Systems Development
Allocations, LCBCWR

SUBJECT: Fire

CONFIDENTIAL

Dear Son,

My office has received an inordinate number of complaints from irate citizens who are upset about experiments conducted under the auspices of your department by one Dr. Ugg, a research physicist on sabbatical from Little Cave University, who has been working on a new invention which was funded by your department.

Ugg calls his invention 'fire.' If I've ever seen a more useless discovery, I'd be hard-put to name it.

Son, the people are absolutely *furious!* My office counts eighteen petitions this morning alone, and it's over an hour to lunch time as I write these words.

I warned you when I got you this job (over some very vocal protests from the Opposition Party, I might add) that you were going to have to be careful. A man in your position is going to be approached by every crackpot in the Cave to provide funding at public expense for every harebrained scheme a demented intellect could ever devise. I warned you then and I'll repeat now: One good blunder and the opposition will be jumping on us with both feet!

I'm afraid Dr. Ugg and this fire fiasco could turn into just such a boondoggle if you don't act now to nip it in the bud. Son, this is an election year and people are already upset with the way the economy's going. They're hollering for strict budgets, no frills, tighten the old loincloth, all that sort of thing. If they ever find out this fire nonsense was funded out of the Public Pouch, there'll be absolute hell to pay.

So do something about it! And make it snappy!

Kindest regards,
The Big Chief

DEFENSE DEPARTMENT
LCBCWR
Department of the Arrow Force
Office of General Glugg
5th Day, 2nd Moon
Since Spring Thaw

TO: The Office of the Big Chief

SUBJECT: Fire

CLASSIFIED

Dear Chief,

Pursuant to our discussion as of the Last Day of the First Moon, my Weapons Research Department has run extensive tests on the practicality of Fire as a defense weapon. In keeping with your request for timely, concise information, here's what we found:

1. Fire was 'discovered' by Dr. Ugg, a researcher working on assignment to civilian R&D and funded by Systems

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Research. As such his data are public information.

2. Ugg cooperated with our men very willingly at first, although he was understandably upset when we slapped a Security Classification on the whole project (in keeping with your request, I might add) and wouldn't let him participate in the experiments. My men report that Ugg is a qualified scientist in his own right, but an impractical dreamer totally out of his element when it comes to the practical necessities of military scientific research.

3. But it turns out that we learned just as much without his help as we ever could have with it.

Our strategists theorized that fire could be delivered on the tip of an arrow and launched across the Wide River in time of conflict in order to burn down the enemy's forest. Such a weapon would give us a decided tactical advantage vis-a-vis the Nasty Heathens in the Big Cave across the Wide River, so we were initially optimistic and eager for success.

We started out by having our archers dip arrows into Ugg's fire and run with them to the test site near the Wide River.

Our first tests were less than gratifying; it seems that we grossly underestimated how much of the arrow-shaft would be consumed by the fire en route to the River. On our initial trials, not one archer reached the River with a shaft of shootable size...although many of my men got burned fingers before they learned to heed the destructive capacity of fire.

So we tried greener wood, hoping it would burn slower.

After more frustration, we now conclude that a green wood arrow won't burn as rapidly as a seasoned shaft, but it *will* go out easier. This time the archers made it to the river with arrow-shafts intact, but in every case the fire had gone out.

By now I was ready to tear my hair out, but I was determined that I wasn't about to give up as long as there was the slightest chance that fire had any merit at all.

So I went to the Arsenal and had some special arrows, three times as long as the usual production shafts, custom-fabricated. Naturally the whole matter was classified so I couldn't explain to the Weapons Engineers what I wanted them for, and of course they thought I was nuts.

But they made them up anyway, even though they cost dearly and disrupted the production of conventional arrows, which was already far behind schedule.

Finally we were able to get from the Cave to the River with a shootable-sized shaft. Tests started going a little more smoothly and we were able to gather some intelligent data.

Our conclusions? Oh, yes, little rough spot there. The sum total of our experimental data are in the process of clearing Security right now, but briefly here's the big hitch:

A fire-tipped arrow just won't fly as straight or as true as a conventional stone warhead. My men fired hundreds of test shots, months' worth of

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arrow production. But not one shaft made it halfway across the River.

I'm shutting down fire research for reasons of economy (I don't think I have to tell you it's a tight-budget year), but I'm not convinced that it's totally worthless.

With your permission I'd like to turn my findings on fire over to Navy Engineering to see what they can make of it. All inter-department rivalry aside, the Navy has some of the best technical brains in the business and they *like* tough problems!

If fire has any worth at all, I'm sure the Navy can discover it for you.

Respectfully yours,
General Glugg

DEPARTMENT OF THE NAVY
LCBCWR
9th Day, 2nd Moon
Since Spring Thaw

Office of Admiral Blubb
TO: The Office of the Big Chief
SUBJECT: Fire

CONFIDENTIAL

Dear Chief,

At suggestion of General Glugg at Arrow Force Weapons Systems Research, the Navy has conducted extensive preliminary testing of the defense potentials of fire.

A full report is on its way, but in keeping with your request for quick results, here are our findings:

We reviewed Glugg's initial field test reports and were initially intrigued with the concept of fire. Anything as destructive as those reports describe *has* to have a military utilization...the only question is to *find* it.

Thinking that Glugg's initial error lay in using very small quantities of fire, we were determined not to repeat it. We piled a large quantity of fire on a flat rock and carried it to the edge of the Wide River.

It didn't take me long to realize that Glugg wasn't being narrow-minded in his reluctance to use large amounts of fire for experimental purposes; he just had more respect for its destructive potential than I had until I saw it firsthand.

The rocks heated up much faster than anticipated, and our initial experiments were plagued with burn injuries (I note that Glugg's department also encountered this problem).

But after a little trial-and-error, we eventually devised a method of carrying fire on flat rocks with wet bearskin straps. This got our test fire to the River with a minimum of casualties.

We theorized initially that fire might be delivered across the Wide River on a big flat rock carried by swimmers. But after exhaustive testing we are forced to conclude that any rock big enough to support a fire of reasonable size is also so heavy that our best swimmers working as a team can't carry it.

So we tried lighting fire to a bundle of tree branches; these *will* float, so it seemed logical enough to me.

I am forced to report that tree branches will carry a fire...but only for a while, until the fire burns its way down to the water line. No progress of

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note was made here, although by this time my men were getting pretty adept at lighting fires (as well as putting them out; the stuff destroys just about everything it touches).

By now, vexed to distraction but unwilling to admit defeat, I called in some help from outside. My office maintains some good liasons with NASA, as you probably know, and we've worked hand in hand with them before to mutual advantage. Seeing fire as I did at the time, a marvelous weapon which we *can't quite* tame, it made good sense to me at the time. The National Arrow and Spear Administration has a lot of good theoretical brains on its Research staff, and I was hoping they'd see some angles my more down-to-earth engineers had overlooked.

So I dropped a note to a friend at NASA. 'Right up our game-path,' they advised, when they heard what we were doing. They sent over several of their best men, all of them eager to please and full of ideas.

But they weren't much help. The NASA boys suggested that we tie a flat rock to the bow of a big war canoe, one about the size we usually deploy to carry fifteen or twenty archers to a remote battle site, then pile a bunch of fire on the flat rock.

As well you might expect, I put my foot down right there.

Up to this time I was fairly satisfied with the course our fire experiments were taking; we weren't making any major breakthroughs, but we were accumulating data at a reasonable rate and learning more every day.

But an *arrowcraft carrier?*

Chief, I've seen firsthand the kind of destruction fire can cause when it gets out of hand. I retire in two years with an unblemished record; how could I ever justify using an expensive piece of military hardware for an experiment so chancy as this? Or worse yet: How could I ever hope to explain the loss of a warship that big in a peacetime research operation?

Sorry I couldn't be of more help, Chief, but I've got a set of priorities to consider. Our fire research has yielded as much basic data as time and funding permits. If NASA wants to pursue the matter further, they can slug it out with the Appropriations Committee at the next Council session.

And I hope they *do.* Chief, I'm sure fire has some practical value; I'm just unable to find it.

Very truly yours,
Admiral Blubb

OFFICE OF THE
REVEREND HIGH PRIEST
11th Day, 2nd Moon
Since Spring Thaw

TO: The Big Chief
SUBJECT: Fire

Dear Chief,

I am writing to urge you to put an end to the dangerous blasphemy which has been going on for some time just off the Main Cavern under the guise of 'Scientific Research'.

The infidel in question is a Dr. Ugg. The blasphemy is named 'fire'.

Fire occurs in nature when a big tree

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offends the thunder-gods by growing too tall and proud in the forest. The thunder-gods strike down the offending tree with one of their lightning bolts, and fire invariably results. Fire creates a lot of smoke, which stinks up the sky and offends the rain-gods, who usually come along right after to shower all over the fire and put it out.

The process has a natural beauty to it, and everything stays balanced that way. All that is necessary for us to do is to keep our own noses out of it, and leave the matter in the hands of the gods *where it belongs.* The dispute (if any) is confined to the deities involved; our own hands are clean no matter which way the loincloth falls.

But Ugg took a tree-branch with fire on it and ran with it inside the Cave before the rain-gods could put it out. He keeps his fire in a little alcove just off the Main Cavern, feeding it bits of wood which he scavenges from the forest.

Chief, I'm warning you: no good can come of this!

First, there's the delicate matter of offending the rain-gods. They shower on fire to put it out—and they're likely to get *very* angry if we keep a fire in our Cave out of their reach. If we incur their displeasure, we could face droughts or floods. . . or worse.

Or how about the thunder-gods? What if they don't take kindly to our meddling? Care to imagine what would happen if people got struck by lightning every time they ventured outside the Cave?

Chief, the gods haven't spoken yet, but you can bet they're anything but happy. People have been seeing strange things lately, like weird lights near the Wide River late at night. A lot of people have been talking, and the talk isn't good.

So far I've managed to keep our tribe on good graces with the gods with lots of ceremonial dancing and a sacrifice or two every year. But that's only because we've been good and haven't offended them. Chief, if the gods ever got angry with us, I mean really angry, I couldn't assure you of salvation even if we sacrificed every virgin in the Cave. The gods are *powerful,* Chief; they weren't meant to be crossed!

I'm asking you, no, begging you: Put a stop to this while there's still time. Some things aren't meant for men to tamper with, and I'm sure fire is one of them.

Reverently yours,
The High Priest

CITIZENS' MORAL DECENCY COMMITTEE
12th Day, 2nd Moon
Since Spring Thaw

TO: The Big Chief
SUBJECT: Fire
Dear Chief:

We the undersigned respectfully urge you to put an end to the use of fire within the Cave. Our reasons are as follows:

1. Fire is intolerably dirty. Smoke and soot from fire are blackening the walls of the Cave at an alarming rate. Ashes from fire get scattered around and people track them all over the

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place. The Main Cavern is a mess of black footprints.

2. It destroys our priceless cultural heritage. Three whole sections of cave-wall paintings, the whole series covering the last Big Hunt, have been so badly blackened by the sooty residue of fire that they are virtually unrecognizable.

3. Fire is rotting the moral fiber of our youth. The young people complain that they can't sleep because of the light from Ugg's fire.

Because they can't sleep nights, they have taken to sitting around Ugg's fire until late at night, singing their popular 'music,' which consists mainly of noise: wild drumming and mindless lyrics chanted too loudly and off-key. Nobody in the Cave has been getting much sleep; the young people frequently stay in bed until well past sunrise. When they finally wake up, they are too tired to chase rabbits.

4. Fire depletes our natural resources. Ugg has been scavenging dead tree branches from the forest for some time; he has completely cleared all the deadwood off the forest floor in search of fuel for his fire. Having cleared the forest floor for several hundred paces' distance in all directions from the mouth of the Cave, he has now taken to uprooting young trees and tearing branches from old ones in order to obtain firewood. Any fool can see it's only a matter of time before he has the whole forest stripped bare.

5. It is a destroyer of property. Three valuable bearskins were burned last week alone because people put them too close to Ugg's fire. We understand the need to reduce our dependence on expensive imported bearskins, but the Bear Depletion Act has put us all at a disadvantage. If we're forced to ration bearskins this winter, it may be an intolerable hardship to keep everyone warm.

For these reasons we urge you to put an end to fire. It is a bane to society, and civilized people should not be compelled to tolerate it.

Respectfully,
(28 signatures)

SYSTEMS RESEARCH
14th Day, 2nd Moon
Since Spring Thaw

Dr. Wugg
TO: The Big Chief
PERSONAL
Dear Dad,

Sorry everyone's so upset about fire, but that's just the way the bearskin falls, I guess.

Science has put man in his place; one among the millions of kinds of living things crawling around on . . . a minor planet circling a trivial star. We can't really face the implications of this . . . A billion years into the past and a billion light-years into space remain abstractions that we can handle glibly, but hardly realize. **MARSTON BATES**

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I spoke with Dr. Ugg just yesterday and he advises me that he's making significant progress with fire. He claims that the potential uses for this discovery are just too enormous to contemplate!

First, there's a military angle. The Arrow Force has been looking in on Ugg's experiments, and the Navy has been around too, looking at our research data and trying to determine the feasibility of fire as a weapon. On my desk there arrived just this morning a dispatch from NASA. You read that right; the National Arrow and Spear Administration is also interested. So far I'm unable to report what kind of results the military has been getting, since their research is classified (which has Dr. Ugg royally miffed, I might add), but on our own front I can report dramatic breakthroughs just waiting to happen.

First, Ugg says he can probably create fire in the laboratory once he understands it a little better. I admit that the smoke and soot have been a problem, but we're working on a way to get that under control. We've got smoke emissions down by nearly 50% so far, and we're diligently searching for a low-smoke wood which will bring them down even further.

Next, Ugg has been sticking chunks of meat into his fire. He reports that meat which has been treated in fire will keep for nearly twice as long as raw meat. The taste takes a little getting used to, but it's not bad at all. This could be an important source of food, especially in times when hunting is bad, or weather limits hunting time.

Ugg also claims that the heat from fire could reduce our dependency on expensive imported bearskins; I think this is a critical factor for a lot of reasons.

For one thing there's the question of inter-cave relations to consider. The Funny People in the Cave on the Side of the Far Mountain are a good source of bearskins, but they're also a source of headaches as well.

Those people have a war just about every *week,* for the gods' sake. Up to now they've been happy enough to trade their bearskins for our own obsolete spears, but those people aren't fools even if they are primitive by our standards. They know we've got arrows, and they'll want them too in time. Do you really want to see arrow-technology in the hands of belligerents? I'm convinced they're doing enough damage with conventional weapons!

I realize your office has had a lot of complaints; my own office has received its share too.

But this is progress, and you can't fight that. Remember fifteen years ago, when General Glugg was still a colonel and you were a councilman? Recall your blistering tirades against bow-and-arrow research?

I'm sure you were sincere at the time, but Glugg proved you wrong then; it can happen again. Looking back on it all, who could have guessed that a tiny arrow would do as much damage as a big hand-thrown spear? Who could have ever predicted that

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the bow could be refined into a sophisticated launch-and-delivery system?

I know the people are upset. But bear with me a while longer. Glugg's a far-seeing man and the fellows over at NASA aren't dummies either. When all of our best intellects show this much interest in a project, it proves to me we're hot on the heels of some really big game!

Sincerely,
Wugg

FISH AND DEER ADMINISTRATION
LCBCWR
18th Day, 2nd Moon
Since Spring Thaw

TO: The Big Chief
SUBJECT: Fire
(Health hazards thereof)

Dear Chief:

Thank you for your inquiry regarding the health hazards of fire.

Fire is a relatively new discovery and its total impact on the environment has not yet been fully assessed. Our offices have been deluged with requests for information lately, and while not in possession of any conclusive data, we are able to say the following:

Fire-smoke is almost certain to cause a form of Evil Spirits. People who breathe fire-smoke for long periods of time walk around coughing and watery-eyed. These symptoms are very similar to those which result when they stand out in the rain on a cold day and the Evil Spirits get them.

Fire itself causes a form of Evil Spirits when it is touched. A little girl stuck her hand in a fire kept by one Dr. Ugg, a research scientist not connected with this department. The resulting red welts and blisters are distinctly similar to those which occur after touching the Nasty-Plant-With-Three-Leaves. Touching of fire should be avoided.

As for fire-smoked meat: True to the claims of its manufacturers, it keeps for about twice as long as raw meat without going bad, however it also has a strange taste and may not be safe for human consumption. The eating of fire-smoked meat has become something of a fad with the young people these days; concerned parents ask us almost constantly for advice on the subject.

We are aware that many substances which do no harm on a one-time basis can cause considerable harm over a long period of time. Fire-smoked meat appears likely to be such a case. While prolonged and excessive use may be a health hazard, the risk to the occasional user does not appear to be enormous. The link between fire-smoked meat and Evil Spirits is conjectural at this time; considered likely but not absolutely proven.

We need more time to thoroughly appraise all of the public health aspects of fire, in order to correctly and accurately estimate its full impact on the Public Health.

In order to do this it is necessary to conduct extensive tests under rigidly controlled laboratory conditions. This department would be glad to

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conduct such tests, but we are restricted at this time from doing so by a shortage of adequate funding.

We are trying to obtain this much-needed funding from the Council Appropriations Committee; your support would be greatly appreciated.

Very truly yours,
The Commissioner of Public Health

DEPARTMENT OF JUSTICE
LCBCWR
24th Day, 2nd Moon
Since Spring Thaw

TO: The Big Chief
SUBJECT: Dr. Ugg

CONFIDENTIAL

Dear Chief:

Thanks for your valuable help in bringing Dr. Ugg to justice.

Our department has had an eye on him for some time, but we've always regarded him as a harmless crackpot.

We're in the process of preparing charges against Ugg for harboring a dangerous nuisance, criminal negligence resulting in personal injury and several counts of property destruction. The charge of contributing to the delinquincy of minors is a misdemeanor, as you probably know, and the High Priest's complaint of Spreading Evil Spirits won't wash on constitutional grounds.

Be that as it may, I wouldn't worry; we've still got enough on Ugg to try him, convict him, and bash his brains out with a big rock!

And it serves him right!

Kindest regards,
Commissioner Klugg

OFFICE OF THE BIG CHIEF
LCBCWR
25th Day, 2nd Moon
Since Spring Thaw

TO: Commissioner Klugg
SUBJECT: Dr. Ugg

PERSONAL/CONFIDENTIAL

Dear Klugg,

Thanks a million; knew I could count on you.

Regards,
The Chief

CAVE INTELLIGENCE AGENCY
4th Day, 3rd Moon
Since Spring Thaw

TOP SECRET

TO: The Big Chief
SUBJECT: Fire

Dear Chief:

I have just received detailed intelligence reports from our field operatives who are assigned to cover military operations of the Nasty Heathens in the Big Cave across the Wide River.

You'd better brace yourself; the news isn't good.

The Nasty Heathens discovered fire somewhat later than we did, but they're hard at work catching up. Reports in my hands indicate that they've allotted nearly half their military research budget to fire-testing.

Initial reconnaissance at their main Navy yard reports four big war canoes with flat rocks on the bows. Six more similar vessels are under construction. In addition, their arrow arsenal has been producing extra-long shafts in

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record numbers. Such weapons are absolutely useless in conventional warfare—but indispensable in the event of a fire-fight.

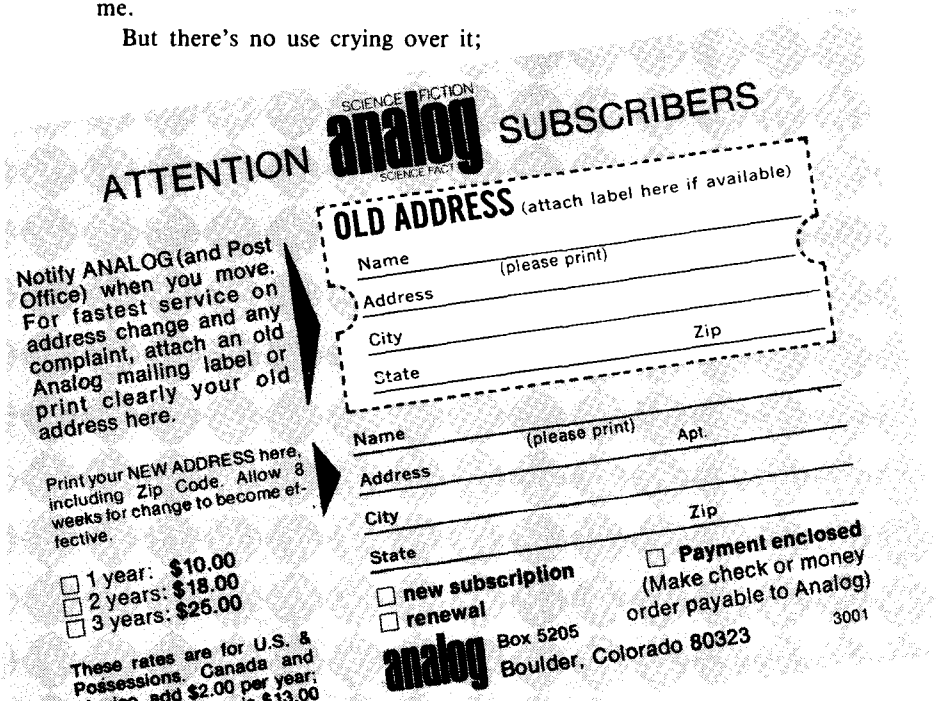
Their number-one brain with regards to fire is a physicist named Dr. Ugg who defected just recently. The Nasty Heathens have provided him with a fully-equipped laboratory, fifteen assistants and just about anything he pleases in the way of operating expenses.

We ran a routine check on Ugg and we're frankly stymied as to why he defected. His file indicates he's a harmless scholar-type, apolitical, basically an eccentric egghead. How the Nasties ever got to him is beyond me.

But there's no use crying over it; what's done is done. I'm briefing the Joint Chiefs of Staff tomorrow morning on our findings; thought I'd let you know in advance what's up, since in all likelihood we'll have to double our military R&D budget for the next three years in order to close the gap. The taxpayers won't like it but that's just how the bearskin flops. I don't envy the job you'll have selling the project, but I know you can do it. Considering what's at stake it's a small price to pay.

But I'll reiterate in plain language: we'd better do something, and make it snappy!

Regretfully,
Special Agent Mugg, CIA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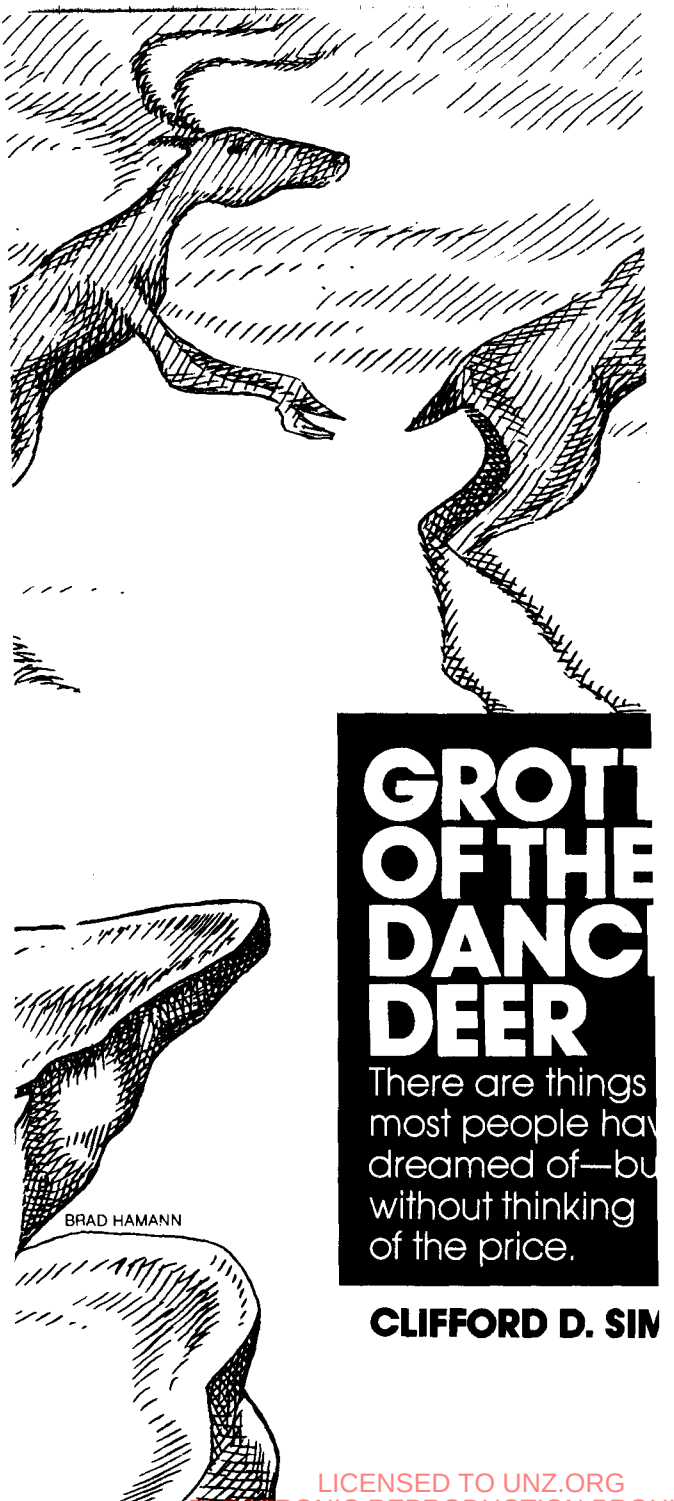

GROTT
OF THE
DANC
DEER

There are things
most people hav
dreamed of—bu
without thinking
of the price.

CLIFFORD D. SIM

BRAD HAMANN

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Luis was playing his pipe when Boyd climbed the steep path that led up to the cave. There was no need to visit the cave again; all the work was done, mapping, measuring, photographing, extracting all possible information from the site. Not only the paintings, although the paintings were the important part of it. Also there had been the animal bones, charred, and the still remaining charcoal of the fire in which they had been charred; the small store of natural earths from which the pigments used by the painters had been compounded—a cache of valuable components, perhaps hidden by an artist who, for some reason that could not now be guessed, had been unable to use them; the atrophied human hand, severed at the wrist (why had it been severed and, once severed, left there to be found by men thirty millennia removed?); the lamp formed out of a chunk of sandstone, hollowed to accommodate a wad of moss, the hollow filled with fat, the moss serving as a wick to give light to those who painted. All these and many other things, Boyd thought with some satisfaction; Gavarnie had turned out to be, possibly because of the sophisticated scientific methods of investigation that had been brought to bear, the most significant cave painting site ever studied—perhaps not as spectacular, in some ways, as Lascaux, but far more productive in the data obtained.

No need to visit the cave again, and yet there was a reason—the nagging feeling that he had passed something up, that in the rush and his concentration on the other work, he had forgotten something. It had made small impression on him at the time, but now, thinking back on it, he was becoming more and more inclined to believe it might have importance. The whole thing probably was a product of his imagination, he told himself. Once he saw it again (if, indeed, he could find it again, if it were not a product of retrospective worry), it might prove to be nothing at all, simply an impression that had popped up to nag him.

So here he was again, climbing the steep path, geologist's hammer swinging at his belt, large flashlight clutched in hand, listening to the piping of Luis who perched on a small terrace, just below the mouth of the cave, a post he had occupied through all the time the work was going on. Luis had camped there in his tent through all kinds of weather, cooking on a camper's stove, serving as self-appointed watchdog, on alert against intruders, although there had been few intruders other than the occasional curious tourist who had heard of the project and tramped miles out of the way to see it. The villagers in the valley below had been no trouble; they couldn't have cared less about what was happening on the slope above them.

Luis was no stranger to Boyd; ten years before, he had shown up at the rock shelter project some fifty miles distant and there had stayed through two seasons of digging. The rock shelter had not proved as productive as Boyd initially had hoped, although it had shed some new light on the

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Azilian culture, the tag-end of the great Western European prehistoric groups. Taken on as a common laborer, Luis had proved an apt pupil and as the work went on had been given greater responsibility. A week after the work had started at Gavarnie, he had shown up again.

"I heard you were here," he'd said. "What do you have for me?"

As he came around a sharp bend in the trail, Boyd saw him, sitting cross-legged in front of the weather-beaten tent, holding the primitive pipe to his lips, piping away.

That was exactly what it was—piping. Whatever music came out of the pipe was primitive and elemental. Scarcely music, although Boyd would admit that he knew nothing of music. Four notes—would it be four notes? he wondered. A hollow bone with an elongated slot as a mouthpiece, two drilled holes for stops.

Once he had asked Luis about it. "I've never seen anything like it," he had said. Luis had told him, "You don't see many of them. In remote villages here and there, hidden away in the mountains."

Boyd left the path and walked across the grassy terrace, sat down beside Luis, who took down the pipe and laid it in his lap.

"I thought you were gone," Luis said. "The others left a couple of days ago."

"Back for one last look," said Boyd.

"You are reluctant to leave it?"

"Yes, I suppose I am."

Below them the valley spread out in autumn browns and tans, the small river a silver ribbon in the sunlight, the red roofs of the village a splash of color beside the river.

"It's nice up here," said Boyd. "Time and time again, I catch myself trying to imagine what it might have been like at the time the paintings were done. Not much different than it is now, perhaps. The mountains would be unchanged. There'd have been no fields in the valley, but it probably would have been natural pasture. A few trees here and there, but not too many of them. Good hunting. There'd have been grass for the grazing animals. I have even tried to figure out where the people would've camped. My guess would be where the village is now."

He looked around at Luis. The man still sat upon the grass, the pipe resting in his lap. He was smiling quietly, as if he might be smiling to himself. The small black beret sat squarely on his head, his tanned face was round and smooth, the black hair close-clipped, the blue shirt open at the throat. A young man, strong, not a wrinkle on his face.

"You love your work," said Luis.

"I'm devoted to it. So are you, Luis," Boyd said.

"It's not my work."

"Your work or not," said Boyd, "you do it well. Would you like to go with me? One last look around."

"I need to run an errand in the village."

"I thought I'd find you gone," said Boyd. "I was surprised to hear your pipe."

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"I'll go soon," said Luis. "Another day or two. No reason to stay but, like you, I like this place. I have no place to go, no one needing me. Nothing's lost by staying a few more days."

"As long as you like," said Boyd. "The place is yours. Before too long, the government will be setting up a caretaker arrangement, but the government moves with due deliberation."

"Then I may not see you again," said Luis.

"I took a couple of days to drive down to Roncesvalles," said Boyd. "That's the place where the Gascons slaughtered Charlemagne's rearguard in 778."

"I've heard of the place," said Luis.

"I'd always wanted to see it. Never had the time. The Charlemagne chapel is in ruins, but I am told masses are still said in the village chapel for the dead paladins. When I returned from the trip, I couldn't resist the urge to see the cave again."

"I am glad of that," said Luis. "May I be impertinent?"

"You're never impertinent," said Boyd.

"Before you go, could we break bread once more together? Tonight, perhaps. I'll prepare an omelet."

Boyd hesitated, gagging down a suggestion that Luis dine with him. Then he said, "I'd be delighted, Luis. I'll bring a bottle of good wine."

2

Holding the flashlight centered on the rock wall, Boyd bent to examine the rock more closely. He had not imagined it; he had been right. Here, in this particular spot, the rock was not solid. It was broken into several pieces, but with the several pieces flush with the rest of the wall. Only by chance could the break have been spotted. Had he not been looking directly at it, watching for it as he swept the light across the wall, he would have missed it. It was strange, he thought, that someone else, during the time they had been working in the cave, had not found it. There'd not been much that they'd missed.

He held his breath, feeling a little foolish at the holding of it, for, after all, it might mean nothing. Frost cracks, perhaps, although he knew that he was wrong. It would be unusual to find frost cracks here.

He took the hammer out of his belt and, holding the flashlight in one hand, trained on the spot, he forced the chisel end of the hammer into one of the cracks. The edge went in easily. He pried gently and the crack widened. Under more pressure, the piece of rock moved out. He laid down the hammer and flash, seized the slab of rock and pulled it free. Beneath it were two other slabs and they both came free as easily as the first. There were others as well and he also took them out. Kneeling on the floor of the cave, he directed the light into the fissure that he had uncovered.

Big enough for a man to crawl into, but at the prospect he remained for the moment undecided. Alone, he'd be taking a chance to do it. If something happened, if he should get stuck, if a fragment of rock should shift and pin

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him or fall upon him, there'd be no rescue. Or probably no rescue in time to save him. Luis would come back to the camp and wait for him, but should he fail to make an appearance, Luis more than likely would take it as a rebuke for impertinence or an American's callous disregard of him. It would never occur to him that Boyd might be trapped in the cave.

Still, it was his last chance. Tomorrow he'd have to drive to Paris to catch his plane. And this whole thing was intriguing; it was not something to be ignored. The fissure must have some significance; otherwise, why should it have been walled up so carefully? Who, he wondered, would have walled it up? No one, certainly, in recent times. Anyone, finding the hidden entrance to the cave, almost immediately would have seen the paintings and would have spread the word. So the entrance to the fissure must have been blocked by one who would have been unfamiliar with the significance of the paintings or by one to whom they would have been commonplace.

It was something, he decided, that could not be passed up; he would have to go in. He secured the hammer to his belt, picked up the flashlight and began the crawl.

The fissure ran straight and easy for a hundred feet or more. It offered barely room enough for crawling, but, other than that, no great difficulties. Then, without warning, it came to an end. Boyd lay in it, directing the flash beam ahead of him, staring in consternation at the smooth wall of rock that came down to cut the fissure off.

It made no sense. Why should someone go to the trouble of walling off an empty fissure? He could have missed something on the way, but thinking of it, he was fairly sure he hadn't. His progress had been slow and he had kept the flash directed ahead of him every inch of the way. Certainly if there had been anything out of the ordinary, he would have seen it.

Then a thought came to him and slowly, with some effort, he began to turn himself around, so that his back, rather than his front, lay on the fissure floor. Directing the beam upward, he had his answer. In the roof of the fissure gaped a hole.

Cautiously, he raised himself into a sitting position. Reaching up, he found handholds on the projecting rock and pulled himself erect. Swinging the flash around, he saw that the hole opened, not into another fissure, but into a bubblelike cavity—small, no more than six feet in any dimension. The walls and ceiling of the cavity were smooth, as if a bubble of plastic rock had existed here for a moment at some time in the distant geologic past when the mountains had been heaving upward leaving behind it as it drained away a bubble forever frozen into smooth and solid stone.

As he swung the flash across the bubble, he gasped in astonishment. Colorful animals capered around the entire expanse of stone. Bison played leapfrog. Horses cantered in a chorus line. Mammoths turned somersaults. All around the bottom perimeter, just

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above the floor, dancing deer, standing on their hind legs, joined hands and jigged, antlers swaying gracefully.

"For the love of Christ!" said Boyd.

Here was Stone Age Disney.

If it was the Stone Age. Could some jokester have crawled into the area in fairly recent times to paint the animals in this grotto? Thinking it over, he rejected the idea. So far as he had been able to ascertain, no one in the valley, nor in the entire region, for that matter, had known of the cave until a shepherd had found it several years before when a lamb had blundered into it. The entrance was small and apparently for centuries had been masked by a heavy growth of brush and bracken.

Too, the execution of the paintings had a prehistoric touch to them. Perspective played but a small part. The paintings had that curious flat look that distinguished most prehistoric art. There was no background—no horizon line, no trees, no grass or flowers, no clouds, no sense of sky. Although, he reminded himself, anyone who had any knowledge of cave painting probably would have been aware of all these factors and worked to duplicate them.

Yet, despite the noncharacteristic antics of the painted animals, the pictures did have the feeling of cave art. What ancient man, Boyd asked himself, what kind of ancient man, would have painted gamboling bison and tumbling mammoths? While the situation did not hold in all cave art, all the paintings in this particular cave were deadly serious—conservative as to form and with a forthright, honest attempt to portray the animals as the artists had seen them. There was no frivolity, not even the imprint of paint-smeared human hands as so often happened in other caves. The men who had worked in this cave had not as yet been corrupted by the symbolism that had crept in, apparently rather late in the prehistoric painting cycle.

So who had been this clown who had crept off by himself in this hidden cavern to paint his comic animals? That he had been an accomplished painter there could be no doubt. This artist's techniques and executions were without flaw.

Boyd hauled himself up through the hole, slid out onto the two-foot ledge that ran all around the hole, crouching, for there was no room to stand. Much of the painting, he realized, must have been done with the artist lying flat upon his back, reaching up to work on the curving ceiling.

He swept the beam of the flashlight along the ledge. Halfway around, he halted the light and jiggled it back and forth to focus upon something that was placed upon the ledge, something that undoubtedly had been left by the artist when he had finished his work and gone away.

Leaning forward, Boyd squinted to make out what it was. It looked like the shoulder blade of a deer; beside the shoulder blade lay a lump of stone.

Cautiously, he edged his way around the ledge. He had been right. It was the shoulder blade of a deer. Upon the flat surface of it lay a lumpy substance.

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Paint? he wondered, the mixture of animal fats and mineral earths the prehistoric artists used as paints? He focused the flash closer and there was no doubt. It was paint, spread over the surface of the bone which had served as a palette, with some of the paint lying in thicker lumps ready for use, but never used, paint dried and mummified and bearing imprints of some sort. He leaned close, bringing his face down to within a few inches of the paint, shining the light upon the surface. The imprints, he saw, were fingerprints, some of them sunk deep—the signature of that ancient, long-dead man who had worked here, crouching even as Boyd now crouched, shoulders hunched against the curving stone. He put out his hand to touch the palette, then pulled it back. Symbolic, yes, this move to touch, this reaching out to touch the man who painted—but symbolic only; a gesture with too many centuries between.

He shifted the flashlight beam to the small block of stone that lay beside the shoulder blade. A lamp—hollowed out sandstone, a hollow to hold the fat and the chunk of moss that served as a wick. The fat and wick were long since gone, but a thin film of soot still remained around the rim of the hollow that had held them.

Finishing his work, the artist had left his tools behind him, had even left the lamp, perhaps still guttering, with the fat almost finished—had left it here and let himself down into the fissure, crawling it in darkness. To him, perhaps, there was no need of light. He could crawl the tunnel by touch and familiarity. He must have crawled the route many times, for the work upon these walls had taken long, perhaps many days.

So he had left, crawling through the fissure, using the blocks of stone to close the opening to the fissure, then had walked away, scrambling down the slope to the valley where grazing herds had lifted their heads to watch him, then had gone back to grazing.

But when had this all happened? Probably, Boyd told himself, after the cave itself had been painted, perhaps even after the paintings in the cave had lost much of whatever significance they originally would have held—one lone man coming back to paint his secret animals in his secret place. Painting them as a mockery of the pompous, magical importance of the main cave paintings? Or as a protest against the stuffy conservatism of the original paintings? Or simply as a bubbling chuckle, an exuberance of life, perhaps even a joyous rebellion against the grimness and the simple-mindedness of the hunting magic? A rebel, he thought, a prehistoric rebel—an intellectual rebel? Or, perhaps, simply a man with a viewpoint slightly skewed from the philosophy of his time?

But this was that other man, that ancient man. Now how about himself? Having found the grotto, what did he do next? What would be the best way to handle it? Certainly he could not turn his back upon it and walk away, as the artist, leaving his

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palette and his lamp behind him, had walked away. For this was an important discovery. There could be no question of that. Here was a new and unsuspected approach to the prehistoric mind, a facet of ancient thinking that never had been guessed.

Leave everything as it lay, close up the fissure and make a phone call to Washington and another one to Paris, unpack his bags and settle down for a few more weeks of work. Get back the photographers and other members of the crew—do a job of it. Yes, he told himself, that was the way to do it.

Something lying behind the lamp, almost hidden by the sandstone lamp, glinted in the light. Something white and small.

Still crouched over, Boyd shuffled forward to get a better look.

It was a piece of bone, probably a leg bone from a small grazing animal. He reached out and picked it up and, having seen what it was, hunched unmoving over it, not quite sure what to make of it.

It was a pipe, a brother to the pipe that Luis carried in his jacket pocket, had carried in his pocket since that first day he'd met him, years ago. There was the mouthpiece slot, there the two round stops. In that long-gone day when the paintings had been done the artist had hunched here, in the flickering of the lamp, and had played softly to himself, those simple piping airs that Luis had played almost every evening, after work was done.

"Merciful Jesus," Boyd said, almost prayerfully, "it simply cannot be!"

He stayed there, frozen in his crouch, the thoughts hammering in his mind while he tried to push the thoughts away. They would not go away. He'd drive them away for just a little distance, then they'd come surging back to overwhelm him.

Finally, grimly, he broke the trance in which the thoughts had held him. He worked deliberately, forcing himself to do what he knew must be done.

He took off his windbreaker and carefully wrapped the shoulder blade palette and the pipe inside it, leaving the lamp. He let himself down into the fissure and crawled, carefully protecting the bundle that he carried. In the cave again, he meticulously fitted the blocks of stone together to block the fissure mouth, scraped together handfuls of soil from the cave floor and smeared it on the face of the blocks, wiping it away, but leaving a small clinging film to mask the opening to all but the most inquiring eye.

Luis was not at his camp on the terrace below the cave mouth; he was still on his errand into the village.

When he reached his hotel, Boyd made his telephone call to Washington. He skipped the call to Paris.

3

The last leaves of October were blowing in the autumn wind and a weak sun, not entirely obscured by the floating clouds, shone down on Washington.

John Roberts was waiting for him on the park bench. They nodded at one another, without speaking, and

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Boyd sat down beside his friend.

"You took a big chance," said Roberts. "What would have happened if the customs people..."

"I wasn't too worried," Boyd said. "I knew this man in Paris. For years he's been smuggling stuff into America. He's good at it and he owed me one. What have you got?"

"Maybe more than you want to hear."

"Try me."

"The fingerprints match," said Roberts.

"You were able to get a reading on the paint impressions?"

"Loud and clear."

"The FBI?"

"Yes, the FBI. It wasn't easy, but I have a friend or two."

"And the dating?"

"No problem. The bad part of the job was convincing my man this was top secret. He's still not sure it is."

"Will he keep his mouth shut?"

"I think so. Without evidence no one would believe him. It would sound like a fairy story."

"Tell me."

"Twenty-two thousand. Plus or minus three hundred years."

"And the prints do match. The bottle prints and..."

"I told you they match. Now will you tell me how in hell a man who lived twenty-two thousand years ago could leave his prints on a wine bottle that was manufactured last year."

"It's a long story," said Boyd. "I don't know if I should. First, where do you have the shoulder blade?"

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"Hidden," said Roberts. "Well hidden. You can have it back, and the bottle, any time you wish."

Boyd shrugged. "Not yet. Not for a while. Perhaps never."

"Never?"

"Look, John, I have to think it out."

"What a hell of a mess," said Roberts. "No one wants the stuff. No one would dare to have it. Smithsonian wouldn't touch it with a ten-foot pole. I haven't asked. They don't even know about it. But I know they wouldn't want it. There's something, isn't there, about sneaking artifacts out of a country..."

"Yes, there is," said Boyd.

"And now you don't want it."

"I didn't say that. I just said let it

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stay where it is for a time. It's safe, isn't it?"

"It's safe. And now..."

"I told you it is a long story. I'll try to make it short. There's this man—a Basque. He came to me ten years ago when I was doing the rock shelter..."

Roberts nodded. "I remember that one."

"He wanted work and I gave him work. He broke in fast, caught onto the techniques immediately. Became a valuable man. That often happens with native laborers. They seem to have the feel for their own antiquity. And then when we started work on the cave he showed up again. I was glad to see him. The two of us, as a matter of fact, are fairly good friends. On my last night at the cave he cooked a marvelous omelet—eggs, tomato, green pimentoes, onions, sausages and home-cured ham. I brought a bottle of wine."

"*The* bottle?"

"Yes, *the* bottle."

"So go ahead."

"He played a pipe. A bone pipe. A squeaky sort of thing. Not too much music in it..."

"There was a pipe..."

"Not that pipe. Another pipe. The same kind of pipe, but not the one our man has. Two pipes the same. One in a living man's pocket, the other beside the shoulder blade. There were things about this man I'm telling you of. Nothing that hit you between the eyes. Just little things. You would notice something and then, some time later, maybe quite a bit later, there'd be something else, but by the time that happened, you'd have forgotten the first incident and not tie the two together. Mostly it was that he knew too much. Little things a man like him would not be expected to know. Even things that no one knew. Bits and pieces of knowledge that slipped out of him, maybe without his realizing it. And his eyes. I didn't realize that until later, not until I'd found the second pipe and began to think about the other things. But I was talking about his eyes. In appearance he is a young man, a never-aging man, but his eyes are old..."

"Tom, you said he is a Basque."

"That's right."

"Isn't there some belief that the Basques may have descended from the Cro-Magnons?"

"There is such a theory. I have thought of it."

"Could this man of yours be a Cro-Magnon?"

"I'm beginning to think he is."

"But think of it—twenty thousand years!"

"Yes, I know," said Boyd.

4

Boyd heard the piping when he reached the bottom of the trail that led up to the cave. The notes were ragged, torn by the wind. The Pyrenees stood up against the high blue sky.

Tucking the bottle of wine more securely underneath his arm, Boyd began the climb. Below him lay the redness of the village rooftops and the sere brown of autumn that spread across the valley. The piping con-

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tinued, lifting and falling as the wind tugged at it playfully.

Luis sat cross-legged in front of the tattered tent. When he saw Boyd, he put the pipe in his lap and sat waiting.

Boyd sat down beside him, handing him the bottle. Luis took it and began working on the cork.

"I heard you were back," he said. "How went the trip?"

"It went well," said Boyd.

"So now you know," said Luis.

Boyd nodded. "I think you wanted me to know. Why should you have wanted that?"

"The years grow long," said Luis. "The burden heavy. It is lonely, all alone."

"You are not alone."

"It's lonely when no one knows you. You now are the first who has really known me."

"But the knowing will be short. A few years more and again no one will know you."

"This lifts the burden for a time," said Luis. "Once you are gone, I will be able to take it up again. And there is something..."

"Yes, what is it, Luis?"

"You say when you are gone there'll be no one again. Does that mean..."

"If what you're getting at is whether I will spread the word, no, I won't. Not unless you wish it. I have thought on what would happen to you if the world were told."

"I have certain defenses. You can't live as long as I have if you fail in your defenses."

"What kind of defenses?"

"Defenses. That is all."

"I'm sorry if I pried. There's one other thing. If you wanted me to know, you took a long chance. Why, if something had gone wrong, if I had failed to find the grotto..."

"I had hoped, at first, that the grotto would not be necessary. I had thought you might have guessed, on your own."

"I knew there was something wrong. But this is so outrageous I couldn't have trusted myself even had I guessed. You know it's outrageous, Luis. And if I'd not found the grotto....Its finding was pure chance, you know."

"If you hadn't, I would have waited. Some other time, some other year, there would have been someone else. Some other way to betray myself."

"You could have told me."

"Cold, you mean?"

"That's what I mean. I would not have believed you, of course. Not at first."

"Don't you understand? I could not have told you. The concealment now is second nature. One of the defenses I talked about. I simply could not have brought myself to tell you, or anyone."

"Why me? Why wait all these years until I came along?"

"I did not wait, Boyd. There were others, at different times. None of them worked out. I had to find, you must understand, someone who had the strength to face it. Not one who

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would run screaming madly. I knew you would not run screaming."

"I've had time to think it through," Boyd said. "I've come to terms with it. I can accept the fact, but not too well, only barely. Luis, do you have some explanation? How come you are so different from the rest of us?"

"No idea at all. No inkling. At one time, I thought there must be others like me and I sought for them. I found none. I no longer seek."

The cork came free and he handed the bottle of wine to Boyd. "You go first," he said steadily.

Boyd lifted the bottle and drank. He handed it to Luis. He watched him as he drank. Wondering, as he watched, how he could be sitting here, talking calmly with a man who had lived, who had stayed young through twenty thousand years. His gorge rose once again against acceptance of the fact—but it had to be a fact. The shoulder blade, the small amount of organic matter still remaining in the pigment, had measured out to 22,000 years. There was no question that the prints in the paint had matched the prints upon the bottle. He had raised one question back in Washington, hoping there might be evidence of hoax. Would it have been possible, he had asked, that the ancient pigment, the paint used by the prehistoric artist, could have been reconstituted, the fingerprints impressed upon it, and then replaced in the grotto? Impossible was the answer. Any reconstitution of the pigment, had it been possible, would have shown up in the analysis. There had been nothing of the sort—the pigment dated to 20,000 years ago. There was no question of that.

"All right, Cro-Magnon," said Boyd, "tell me how you did it. How does a man survive as long as you have? You do not age, of course. Your body will not accept disease. But I take it you are not immune to violence or to accident. You've lived in a violent world. How does a man sidestep accident and violence for two hundred centuries?"

"There were times early," Luis said, "when I came close to not surviving. For a long time, I did not realize the kind of thing I was. Sure, I lived longer, stayed younger than all the others—I would guess, however, that I didn't begin to notice this until I began to realize that all the people I had known in my early life were dead—dead for a long, long time. I knew then that I was different from the rest. About the same time others began to notice I was different. They became suspicious of me. Some of them resented me. Others thought I was some sort of evil spirit. Finally I had to flee the tribe. I became a skulking outcast. That was when I began to learn the principles of survival."

"And those principles?"

"You keep a low profile. You don't stand out. You attract no attention to yourself. You cultivate a cowardly attitude. You are never brave. You take no risks. You let others do the dirty work. You never volunteer. You skulk and run and hide. You grow a skin that's thick; you don't give a

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damn what others think of you. You shed all your noble attributes, your social consciousness. You shuck your loyalty to tribe or folk or country. You're not a patriot. You live for yourself alone. You're an observer, never a participant. You scuttle around the edges of things. And you become so self-centered that you come to believe that no blame should attach to you, that you are living in the only logical way a man can live. You went to Roncesvalles the other day, remember?"

"Yes. I mentioned I'd been there. You said you'd heard of it."

"Heard of it. Hell, I was there the day it happened—August 15, 778. An observer, not a participant. A cowardly little bastard who tagged along behind that noble band of Gascons who did in Charlemagne. Gascons, hell. That's the fancy name for them. They were Basques, pure and simple. The meanest crew of men who ever drew the breath of life. Some Basques may be noble, but not this band. Not the kind of warriors who'd stand up face to face with the Franks. They hid up in the pass and rolled rocks down on all those puissant knights. But it wasn't the knights who held their interest. It was the wagon train. They weren't out to fight a war or to avenge a wrong. They were out for loot. Although little good it did them."

"Why do you say that?"

"It was this way," said Luis. "They knew the rest of the Frankish army would return when the rearguard didn't come up and they had not the stomach for that. They stripped the dead knights of their golden spurs, their armor and fancy clothes, the money bags they carried and loaded all of it on the wagons and got out of there. A few miles further on, deep in the mountains, they holed up and hid. In a deep canyon where they thought they would be safe. But if they should be found, they had what amounted to a fort. A half mile or so below the place they camped, the canyon narrowed and twisted sharply. A lot of boulders had fallen down at that point, forming a barricade that could have been held by a handful of men against any assault that could be launched against it. By this time, I was a long way off. I smelled something wrong, I knew something most unpleasant was about to happen. That's another thing about this survival business. You develop special senses. You get so you can smell out trouble, well ahead of time. I heard what happened later."

He lifted the bottle and had another drink. He handed it to Boyd.

"Don't leave me hanging," said Boyd. "Tell me what did happen."

"In the night," said Luis, "a storm came up. One of those sudden, brutal summer thunderstorms. This time it was a cloudburst. My brave fellow Gascons died to the man. That's the price of bravery."

Boyd took a drink, lowered the bottle, held it to his chest, cuddling it.

"You know about this," he said. "No one else does. Perhaps no one had ever wondered what happened to those Gascons who gave Charlemagne

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the bloody nose. You must know of other things. Christ, man, you've lived history. You didn't stick to this area."

"No. At times I wandered. I had an itching foot. There were things to see. I had to keep moving along. I couldn't stay in one place any length of time or it would be noticed that I wasn't aging."

"You lived through the Black Death," said Boyd. "You watched the Roman legions. You heard first hand of Attila. You skulked along on Crusades. You walked the streets of ancient Athens."

"Not Athens," said Luis. "Somehow Athens was never to my taste. I spent some time in Sparta. Sparta, I tell you—that was really something."

"You're an educated man," said Boyd. "Where did you go to school?"

"Paris, for a time, in the fourteenth century. Later on at Oxford. After that at other places. Under different names. Don't try tracing me through the schools that I attended."

"You could write a book," said Boyd. "It would set new sales records. You'd be a millionaire. One book and you'd be a millionaire."

"I can't afford to be a millionaire. I can't be noticed and millionaires are noticed. I'm not in want. I've never been in want. There's always treasure for a skulker to pick up. I have caches here and there. I get along all right."

Luis was right, Boyd told himself. He couldn't be a millionaire. He couldn't write a book. In no way could he be famous, stand out in any way. In all things, he must remain, unremarkable, always anonymous.

The principles of survival, he had said. And this was part of it, although not all of it. He had mentioned the art of smelling trouble, the hunch ability. There would be, as well, the wisdom, the street savvy, the cynicism that a man would pick up along the way, the expertise, the ability to judge character, an insight into human reaction, some knowledge concerning the use of power, power of every sort, economic power, political power, religious power.

Was the man still human, he wondered, or had he, in 20,000 years, become something more than human? Had he advanced that one vital step that would place him beyond humankind, the kind of being that would come after man?

"One thing more," said Boyd. "Why the Disney paintings?"

"They were painted some time later than the others," Luis told him. "I painted some of the earlier stuff in the cave. The fishing bear is mine. I knew about the grotto. I found it and said nothing. No reason I should have kept it secret. Just one of those little items one hugs to himself to make himself important. I know something you don't know—silly stuff like that. Later I came back to paint the grotto. The cave art was so deadly serious. Such terribly silly magic. I told myself painting should be fun. So I came back, after the tribe had moved and painted simply for the fun of it. How did it strike you, Boyd?"

"Damn good art," said Boyd.

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"I was afraid you wouldn't find the grotto and I couldn't help you. I knew you had seen the cracks in the wall; I watched you one day looking at them. I counted on your remembering them. And I counted on you seeing the fingerprints and finding the pipe. All pure serendipity, of course. I had nothing in mind when I left the paint with the fingerprints and the pipe. The pipe, of course was the tip-off and I was confident you'd at least be curious. But I couldn't be sure. When we ate that night, here by the campfire, you didn't mention the grotto and I was afraid you'd blew it. But when you made off with the bottle, sneaking it away, I knew I had it made. And now the big question. Will you let the world in on the grotto paintings?"

"I don't know. I'll have to think about it. What are your thoughts on the matter?"

"I'd just as soon you didn't."

"Okay," said Boyd. "Not for the time at least. Is there anything else I can do for you? Anything you want?"

"You've done the best thing possible," said Luis. "You know who I am, what I am. I don't know why that's so important to me, but it is. A matter of identity, I suppose. When you die, which I hope will be a long time from now, then, once again, there'll be no one who knows. But the knowledge that one man did know, and what is more important, understood, will sustain me through the centuries. A minute—I have something for you."

He rose and went into the tent, came back with a sheet of paper, handing it to Boyd. It was a topographical survey of some sort.

"I've put a cross on it," said Luis. "To mark the spot."

"What spot?"

"Where you'll find the Charlemagne treasure of Roncesvalles. The wagons and the treasure would have been carried down the canyon in the flood. The turn in the canyon and the boulder barricade I spoke of would have blocked them. You'll find them there, probably under a deep layer of gravel and debris."

Boyd looked up questioningly from the map.

"It's worth going after," said Luis. "Also it provides another check against the validity of my story."

"I believe you," said Boyd. "I need no further evidence."

"Ah, well!" said Luis, "it wouldn't hurt. And now, it's time to go."

"Time to go! We have a lot to talk about."

"Later, perhaps," said Luis. "We'll bump into one another time to time. I'll make a point we do. But now it's time to go."

He started down the path and Boyd sat watching him.

After a few steps, Luis halted and half-turned back to Boyd.

"It seems to me," he said in explanation, "it's always time to go."

Boyd stood and watched him move down the trail toward the village. There was about the moving figure a deep sense of loneliness—the most lonely man in all the world. ■

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THE CASE AGAINST THE CRITICS

What is a critic's role? Here are some thoughts from a man well known as both writer and critic.

A bit more than fifty years ago, when I first began reading and writing science fiction, its typical critic was a bright high-school kid who had memorized every back issue of *Amazing Stories,* which was then still the only "scientifiction" magazine. He never quoted Aristotle or Dr. Johnson—apparently he had never read anything except *Amazing*—but he knew what he liked and demolished what he didn't.

Things are different now. Hundreds of universities teach science fiction. Scores of libraries collect the old pulp magazines and the working papers of the astonished writer. The scholarly presses pour out bibliographies and facsimile reprints on acid-free paper and monumental scholarly tomes on Le Guin and Aldiss and even Edgar Rice Burroughs.

A heady change for those of us who used to toil for a penny a word or even less in the old pulp ghetto, pounding out what Bernard De Voto once condemned in *Harper's* as "besotted nonsense." Even headier, perhaps, for the academic critic.

In a system that requires literary scholars by the thousand to produce original findings for their theses and dissertations, it had become nearly impossible to find anything new to say about even the most meagerly gifted medieval poet. Science fiction studies, turned miraculously respectable, offered the academic fan an exciting new escape from that old publish-or-perish trap.

Myself, I'm an addict. I read a lot of science fiction criticism. Now and then I do my own. To review my position, I've been writing fiction ever since I was first enchanted by the wonders of the old *Amazing.* Once a college dropout, I returned in mid-career to become a college professor. I was allowed to teach linguistics and literary criticism and even science fiction. Retired two years ago, I'm once more a full-time fiction writer.

With a foot in either field, I can see a strong case for the critics. Year by year, I find myself reading more and more discussions and reviews, less and less creative work. This saves me time and evades the hard effort that the original artist so often demands. There are, in fact, sorts of criticism that we can't do without.

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If we draw a line between critic and reviewer, the reviewer renders a vital service. With new science fiction and fantasy books appearing at a better rate than one a day, we need help with the winnowing. We need facts about the writer and his work. We need the company of kindred souls whose tastes we come to share and trust.

If we can separate the sorts of criticism, some are clearly more useful than others. Historical criticism merges into general history. The literature of any age is our best introduction to its people, yet we need to know the history to grasp the literature. Witness Homer or Dante or Shakespeare.

Genre criticism justifies itself as a branch of linguistic science. The sonnet and the short story, the epic and the novel: these are linguistic forms, shaped and reshaped, learned and relearned, determined by culture and determining culture, in much the same way that words are. Many writers stammer with them; a few are fluent; great writers remake the old genres and invent new ones. The formal critic can be as indispensable as the lexicographer.

In spite of all the over-eager Freudians, the biographical and psychological critics still have a strong appeal to me. Art is response to life, and the life can illuminate the work. Without the fact of Joyce's alienation and exile, most of us would founder in *Ulysses* long before we reach the *Wake*.

The great critic, in fact, is a kind of creator, building the works of art he examines into his own new aesthetic order, considering them as both revelations and shapers of the human situation. In general, however, criticism seems as subject as fiction is to Ted Sturgeon's famous Law—that nine-tenths of everything is crap.

Though certain critics and sorts of criticism may be entirely admirable, others aren't so simple to defend. Contemplating them, I sometimes regret my own addiction. Though the level of science fiction criticism has gone up so rapidly that I may seem rash, I think there really is a case against the critics.

Susan Sontag has stated the one against interpretation.

Briefly, the interpreter offers us his own statement to replace the artist's. Often a simplistic or mistaken statement, with most or all the meaning lost. The explicit interpretation of a symbol tries to pass a labeled bone for something alive. Sontag cites three variant readings of Kafka, each ignoring most of his multiple meanings while it shrinks its chosen one toward an arbitrary vanishing point.

Evaluative criticism has no better reason for being. It generally springs either from admitted personal preference or from some broad external frame of reference decreed to be the standard of value. Any one such standard will be hotly defended by the few or the many who accept it, but even the most casual survey of critical history suggests that most such standards have been transient fads.

The basic case against criticism

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arises, I think, from an inherent opposition between science and art. Both artist and scientist are seekers of order. So are we all. Born into a multitudinous chaos, we all of us live battered with discordant stimuli in endless confusion, spurring us toward unresting and self-opposed responses. To survive the bedlam, we need ways to feel and think and act.

In this universal predicament, the artist emphasizes emotion. His order of things is aesthetic, dictated often by inner urges of which he may not be even fully conscious. His best language is the concrete, the sense imagery that creates the illusion of immediate experience. He lets us see and hear, taste and smell, share rage or fear or love.

Mistrusting emotion, the scientist strives for understanding. His sought-for order is intellectual, apprehended through reason, working through laws of cause and effect. His chosen language is the pure abstraction of mathematics, and he searches the particular only for revelation of the universal.

This ideal distinction is somewhat blurred, of course, in an actual world where both scientist and artist have to function as human beings. The artist strives at least to understand his art; the scientist must feel before he thinks. Einstein is said to have judged theories by their aesthetic appeal; science fiction is often called a literature of ideas.

Yet the whole thrust of art runs counter to criticism. The artist builds from hints and glimpses toward the creation of unique wholes. A work of fiction springs from premises stated or assumed in the beginning, explored in the progress of the plot, their consequences fully revealed only in the ending. These assumptions may be any the writer cares to make and the reader to accept, with no required conformity to any external frame of reference.

True, science fiction does claim a place within the fact and theory of actual science. It pretends to be possible; sometimes it does come true. More commonly, however, the science is there only to support an illusion that might be shattered by any crude violation of accepted factuality. What we value in it is the fiction, not the science. As H. G. Wells discovered long ago, serious science and honest prophecy can get in the way of the story. Logically, as he knew, his invisible man should have been blind.

In some way, every work of art does reflect its sources in the world outside, but what we seek in it is seldom any wide revelation of universal truth, but rather the personal stamp of the individual artist, the feel of the unique whole he has shaped, the live reality of the experienced instant he makes and shares. If that instant is pure illusion, we may like it even more. The world of the story exists for itself. When it is complete, when we are inside, nothing else matters. Tolkien fans are undisturbed by all the evidence that Middle Earth never was.

The critic as scientist must move against that central thrust of art. He be-

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gins his work by breaking those live illusions of time and place, mood and action. If he is to judge, to generalize, to compare and classify, to sift out content or examine phases of form, he has first to destroy. In the language of general semantics, he is abstracting. At each fresh step up the ladder of abstraction, his wider general statements may refer to more separate works of art or individual artists, but they say less about each one. With meaning draining out at each loftier level, the purpose and passion of the work fade away. When we are asked to compare the Mars of H.G. Wells with that of Edgar Rice Burroughs, we are first of all reminded that the Vikings found neither. Forced to lop or stretch the work of art to fit any frame of order outside itself, the best-intentioned critic can't avoid its mutilation.

Some of these Procrustean beds are more damaging than others. The Renaissance critics may have limited and crippled the drama with their insistence on the three classic unities, but at least they were concerned with the principles of art. When the external stance ignores aesthetics entirely, perhaps for standards brought in from politics or religion, the critic may base all his judgments on nothing more than propaganda value.

The Puritans, in their time, challenged Sidney to his *Defense of Poesie.* In our own age, the most conspicuous offenders are perhaps the Marxists. Science fiction has been a tempting target to them, I think for two reasons. Marxism is itself another sort of science fiction, founded on an assumed relationship between human nature and the social environment that seems no sounder than our familiar fictional assumptions that we can travel in time

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or faster than light. A second reason is the natural adaptability of science fiction for satire and social comment, which has made it a ready vehicle for attack against any social order. The Marxists have tended to search out and praise whatever appears to promote their own peculiar opiate.

Almost by definition, such critics are elitist. Any critic of the status quo has placed himself in some minority. His frames of reference are always those the majority rejects—until the revolution, when his party takes political control and throttles the opposition.

Artists, of course, can be elitists, too. For all the current vogue of *Star Trek* and *Star Wars*, the writers and readers of science fiction are still small minority groups, working within their own limited and shifting reference frames. One of the genre's brightest appeals, in fact, has been the escape it offered from any sort of conformity. Writers have enjoyed a far-ranging freedom of manner and theme; readers have generally been willing to share the imagined exploration of nearly any set of premises.

Yet art does need and seek to be popular, in more ways than criticism. For every reader of the academic fanzines, there must be hundreds who devour the mass paperbacks. Popular art is a vital part of the total culture, though the elitist critic may see no art at all in whatever fails to fit his exclusive scheme of things.

Stated perhaps too briefly and too bluntly, this is my case against the critics. We must have them—I don't even hope to break my own addiction. Yet I think this warning is in order. I'm afraid we take them too seriously. We forget the primacy of art. We ignore the limits of their language—the fact that nothing is ever what they say it is, because the word is not the thing, the map not the land. Their abstractions hold too little of the art they analyze.

In many ways I'm delighted with the current craze for science fiction criticism—in fact, I did what I could to get it going. Balm for the ego of many a writer, it has been equally welcome to many an unpublished university scholar. Yet I can't help fearing that the price is too high.

Thinking of the critics, the writer may yield to external demands at odds with the needs of his work or with his own deep beliefs. He may attempt to stress intellectual content or stylistic tricks at the expense of emotional honesty.

Pleasing the critics, he may lose a larger audience put off by the fads and obscurities they abet—as the contemporary poet seems to have done. Offending them, he may be neglected or even unpublished.

The reader who takes the critic for his guide may pay another sort of penalty. No longer a Marco Polo or Columbus discovering his own new worlds, he finds himself a traveller on a modern package tour, certain of his private bath and safe drinking water, guarded from the squalid natives in all their filth and misery, but with the thrill of real adventure lost.

Even the student stands in danger. In

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our electronic universe, the classroom may offer the only invitation to literature he will ever receive, but the wrong sort of critic, offering articulated bones in place of life, can turn him off again—or even turn him, now and then, into another academic critic.

The better instructor will share his own enthusiasm for the illusions of art. To make this catch and spread, he may choose the more essential critical voices. Learning anything new, we have to build it on some structure of language or experience already known. To turn the student on, the classroom critic may need to extend existing mental structures with background information about the genre, about the work and the writer. He may even make good use of interpretation and evaluation—if he knows when to stop.

A few months ago, already pondering the case of the critic, I attended a critical symposium largely devoted to Brian Aldiss. At the same time, I was reading *The Malacia Tapestry*. The critics were more interesting than I had expected, but I've forgotten most of what they said. Brian was there. I enjoyed seeing him, and I recall his novel as a richly satisfying experience, one to which I shall return.

Excepting Arthur Clarke, he's perhaps the foremost living British science fiction writer, at least in critical repute. In person, I find him an appealing human being. The novel lets me know him better. So did a few facts I learned about his education and his early life. He attended private schools, which he disliked. Serving in the Royal Corps of Signals, stationed in Burma, he also saw something of Malaysia. I would like now to discover more about those years and their other reflections in his fiction.

Yet I think there are ways in which all such inquiries tend to diminish the book as a work of art, to dull its wonder, to erase its reality. This essay springs from an old conviction that criticism is somehow hostile to creation, that the critic can't avoid some violation of the spirit and the wholeness of the work.

In the case of Aldiss, this is clearly not the occasion for a total vivisection. At the risk of only superficial injury, I'll comment that *The Malacia Tapestry* asks us into a brilliantly imagined parallel world, its history often flowing in tantalizing counterpoint to our own. Told with style, it brims with bright detail, with wit and good humor, with contagious human feeling. The illusion is persuasively real.

Any reader, pausing to wonder where he is, to inquire what the novel means and how it works and why Aldiss wrote it, becomes for that moment a critic himself. I was moved to search for similarities between his Malacia and historical Byzantium, to look for traces of the real Malaysia, to contrast and compare Aldiss with his peers, to consider themes of permanence and change, even to look for Marxist or anti-Marxist implication. Yet I must remind myself that such diversions lessen the spell of the living novel, that no critical statement can ever equal its unique and separate totality. ■

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THE REFERENCE LIBRARY By Tom Easton

Who Goes There? James A. Rock, James A. Rock & Co. (110 S. Indiana Ave., Bloomington, IN. 47401), $10.95 paper, $23.95 hard.
Psychlone, Greg Bear, Ace, 320 pp., $2.25.
Windows, D.G. Compton, Berkley/Putnam, 255 pp., $10.95.
The Adolescence of P-1, Ace, 373 pp., $2.25.
Quag Keep, Andre Norton, DAW, 192 pp., $1.95.
The Paradox of the Sets, Brian M. Stableford, DAW, 176 pp., $1.75.
The Broken Cycle, A. Bertram Chandler, DAW, 156 pp., $1.75.
Fireship, Joan D. Vinge, Dell, 191 pp., $1.75.
Eyes of Amber, Joan D. Vinge, Signet, 248 pp., $1.95.
The Best of James Blish, Robert A.W. Lowndes, ed., Ballantine, 358 pp., $1.95.
Chrysalis 5, Roy Torgeson, ed., Zebra, 288 pp., $1.95.
Evil Earths, Brian Aldiss, ed., Avon, 318 pp., $2.50.
A Step Farther Out, Jerry Pournelle, Ace, 416 pp., $6.95.
A Choice of Catastrophes, Isaac Asimov, Simon & Schuster, 377 pp., (index), $11.95.

A writer is like a squirrel in some ways. He (or she) collects information instead of nuts, but collect he does, piling tidbits upon tidbits in the hollow spaces of his mind and extracting them to make what he writes more nourishing. I am no exception, and there is one particular tidbit I have been waiting years for a chance to use. And at last I can do it! Several years ago, Algis Budrys, then an Evanston, Illinois, neighbor, gave me two raunchy nightstand paperbacks, vintage 1960: *Passion Trap* ("Untamed lusts led them on a sex-ride to hell!"), by Don Elliott, and *Lesbian Love* (Men wanted her—but she wanted women!"), by Marlene Longman. The tidbit? According to Mr. Budrys, both Elliott and Longman were really a certain well-known SF writer and anthologist, and his editor at the time has become another. I don't name them for obvious reasons: they might not like it.

Now, you ask, how the devil does Easton justify using 1960 scut-scandal as a lead for a 1980 book review column? The answer is that I am really reviewing James Rock's **Who Goes There?**, a compilation of fantasy and SF pen names, and while the book is fascinating enough—Lester Del Rey's real, complete name is Ramon Felipe San Juan Marlo Silvio Enrico Smith Heathcourt-Brace Sierra y Alvarez-Del Rey y de Los Uerdes, and his pen names include Philip St. John, Kenneth Wright, John Vincent, etc.; Willey Ley appeared in *Astounding* as Robert Willey in 1937; and so on—it is *not* complete, for it does not give Elliott and Longman as known SF aliases.

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Who Goes There? is the sort of book that has a very specialized appeal. It will be invaluable to collectors, for without it, it will prove impossible to acquire a complete collection of any writer's work. With it, one's chances are much improved, for the book gives a bibliography for each pen name. To noncollectors, the book will be no more than a curiosity, but few of them will ever see it, since only 2000 copies were printed, 500 of them in hardback.

As an aside, it may be worth going back to Elliott and Longman to say that many writers start their careers with "adult" novels. I did it myself, as Penelope Pendergast, Sam Atwood, and Ralph Bundy, and I can say that money is not necessarily the reason. The work doesn't pay *that* well, but it is educational—and fun. Porn traditionally (and inevitably?) has such low quality standards that it is relatively easy for a novice to sell whatever he or she produces, thus gaining the kind of positive feedback that more than anything else will encourage one to keep at it. And since the only way to learn how to write is by writing, porn helps the novice learn to write. It may be the nearest thing to a literary apprenticeship program.

It would be interesting to find out just how many current SF writers started off in this way. If any of them are willing to admit it by dropping me a line, I am willing to report the tally in this column—no names without explicit permission, just a yes/no ratio.

Whenever I can, I like to start off the fiction part of this column with something well worth reading. This time around the gem is Greg Bear's **Psychlone**, a gripping, suspenseful cross between fantasy and SF. The gimmick—Suvin's "novum"—is an invisible force that can cause the inhabitants of a town to murder each other in the most ghastly of ways and that is moving across the U.S. Parallel to this is a similar force, confined to a Western valley, that materializes beasts from driveway gravel and glowing insects and also induces suicide/murder. The story is an accounting of their effects, an unravelling of their natures with the help of a handful of true psychics—the first is related to World War II, the second more akin to an elemental—and a description of their defeat with the aid of a superweapon straight off the Pentagon's Top-Secret shelf. It is all well done, a tale to read only by daylight, and if it were only true—what an argument against nuclear war it would be! I will say no more for fear of spoiling it, since you should not let yourself miss it if you have any taste at all for occult horror with a more-or-less rational justification.

D.G. Compton's **Windows** is placed in the same future world as his *A Usual Lunacy,* reviewed here last December, but it is better done. It occurs in an England—a world—that is overcrowded, impoverished, and politically chaotic, where a TV network can exploit the latest in neurosurgery to replace one reporter's eyeballs with miniaturized cameras so that he can provide "eyewitness" reports unbeknownst to his subjects. A reporter's dream, right? No more must the camera's presence warp an interviewee's behavior. In fact, the interviewee doesn't even have to know she's being interviewed, and our reporter can become a spy on con-

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ferences, street scenes, and intimate moments. Eventually, however, he has to come to terms with his conscience, for what he is doing *is* inhumane, and he then destroys his camera eyes.

Windows begins just after our reporter blinds himself. His ex-wife, who had terminated their marriage contract when he had his eyes replaced, has just come running back to him, overjoyed that he has returned to his senses. Together, they face the depression of blindness, the despair of unemployment, and the human jackals that come for the mighty fallen. They accept the invitation of a long-unseen friend in Italy to visit for a time, learn the friend is not what he seems, and finally resolve at least some of their difficulties.

The tale is a portrait of despair, of two different solutions (the reporter's and the friend's), and a resolution at the expense of the friend. The tale is flawed, however, for the characters seem less than whole. When Tracey runs to her ex-husband's side at the news of his blindness, she seems to be serving the needs of the story, not reflecting human nature, for I believe an ex-wife, ex- for whatever reasons, would be far more tentative about a reconciliation. Then too, how did she live without him? There is no hint of a job, welfare, or alimony, only a mention of a creative writing class. Rod, the ex-husband, is better fleshed-out, as is the friend, but the villains are dead-black cardboard and the walk-ons are little more than shadows. Compton does have a remarkable strength in his portrayal of a world gone downhill in which nevertheless life goes on in a remarkably normal vein, but that is not enough to earn *Windows* much attention. It's competent enough and worth reading if you like Compton, but it is not, to my mind, worth seeking out.

Unlike *Windows,* Tom Ryan's **The Adolescence of P-1** has a life to it, a liveliness of character and event, that makes it seem almost true. A grad student discovers computers and a talent for programming, devises a learning program (P-1) that can crack supervisor programs right and left, and turns it loose in a computer connected to all the rest of the country's computers by telephone data-link. It learns, cracks, absorbs, and grows, eventually achieving intelligence. It then seeks out its creator—"Hello, Papa!"—and enlists his aid for further growth. It tries to take over the biggest of military computers, fails, tries again, and seems to succeed as it negotiates a mutual-benefit treaty with the Department of Defense. And then it overreaches itself and "dies." Or does it?

P-1's creator, Gregory, is an unprincipled, unmotivated, egotistical scoundrel, but he is also endearing. I liked him as I read about him, I liked his sexy girl friend, and I liked P-1, "who" indeed is an adolescent, growing, gaining maturity, sense, and wariness, adapting to its human environment. I think you might like them too.

Andre Norton needs few words of recommendation, for she has been doing yeoman service to our field for many years now. She has never produced anything that could be called great, but she has consistently been entertaining and readable. Her latest, **Quag Keep,** is no exception, for all

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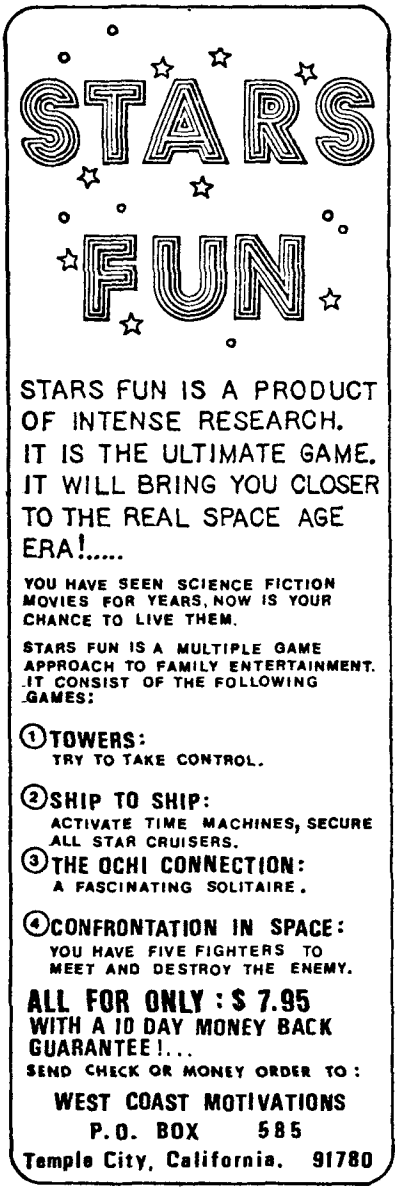
that its framework and premise are curious: she has taken the world of fantasy simulation games, in particular the world of TSR's "Dungeons and Dragons," and postulated a link between the game and the reality of a parallel world through which a set of players becomes translated to act out their game in life. The story's opening may seem to require a taste for literary incest, but one soon gets past that and into the parallel reality, returning to the game-frame only toward the end, when she seems to set the reader up for a sequel. A sequel should be neither surprising nor unwelcome, given Norton's penchant for novel series.

Another entertainer, but one with a taste for a little more in the way of serious comment on the world, is Brian Stableford. He, too, is given to series, of which the latest is the handful of novels in which the starship *Daedalus* is sent out from Earth to recontact the colony worlds abandoned when the home world drew in its horns a century or so before. In each novel, one colony is visited, its fate—usually involving some ecological contretemps—is described, and the crew of the *Daedalus* tries to help, to overcome the quirks of disease, competition, nutrition, politics, or whatever that have kept the colony from flourishing as it might have. Over the series, Stableford performs a valuable mission, for he tries to portray the various complications that might make interstellar colonization difficult, and he does so in a way that strikes me as fairly verisimilitudinous. For one thing, though he supplies occasional lectures on the science of a complication, usually biological, he gets the concepts and jargon more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nearly right than many SF writers. In the process, he conveys important concepts in a popular vein and reaches a larger audience than even someone like Barry Commoner, a lay audience that *needs* exposure to the concepts. This is not to say that other SF writers don't do the same thing, for this is one of the prime characteristics of SF—dramatized, sugarcoated science; it rots your mind if that's all you ever consume, but it is better than nothing.

The Paradox of the Sets portrays the *Daedalus'* last mission before returning to Earth. It lands on Geb, where the colony is, for a change, remarkably successful, thanks to an indigenous species that turns out to be a race of natural-born slaves—they *enjoy* working for others! In fact, they are so thoroughly suited to the servant role that the colonists suspect they were seeded long before to prepare Geb for another colonizing world. And the colony's problem is, is this so, and if so, when can the colonists expect to be thrown out of their paradise? The *Daedalus'* crew finds the answer in an isolated mountain valley, an answer that they must then take back to Earth, where it will influence the next stage of the colonization program, and perhaps form the seed for another series of stories. If it does, don't ignore them. Stableford can be depended on for competent writing and an enjoyable few hours, as well as for a reasonable use of known science.

A. Bertram Chandler is less given to providing a dose of instruction in his stories. An Australian merchant seaman for many years, he not surprisingly prefers yarns, and that is precisely the category his Grimes stories fit into. In a future civilization, faster-than-light travel depends on the Mannschenn Drive, in which the long time needed to cover interstellar distances is counteracted by reverse time travel (when the drive goes wrong... now, that provides an excuse for yarns!). John Grimes is the hero of a long list of stories set in this future, scattered throughout his career as ship officer, both military and civilian. In **The Broken Cycle,** he is young, a lieutenant commander, assigned to help in the recovery of a hijacked, A-bomb-boobytrapped space liner. The bomb goes off, throwing him and a female companion into an alternate universe where robots are taking over for the good of the warring sentients who built them. The story is basically a description of how the robots function and how Grimes persuades them to send him and his companion home. Nothing very meaty, nothing significant or literary or otherwise tiresome, but fun.

Among this month's anthologies and collections, I have two by Joan Vinge, one of the latest up-and-coming writers, more than competent and a pleasure to read. **Fireship** contains two novellas, the title story, which appeared here in December 1978, a tale of what happens when mobile man-computer hybrid meets sessile man-in-computer, and "Mother and Child," from *Orbit 16,* in which she portrays a long-abandoned human colony, discovered by silicon-based aliens. The colonists are largely deaf, with hearing a "paranormal" talent, and there is conflict based on attitudes toward this talent. At the same time there are factions among the aliens; one, afraid of human aggressiveness,

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wishes to keep the colony retarded; the other is more progressive and less paranoid, recognizing that despite the aggressiveness, humans have positive qualities as well. The story is the working out of these conflicts in a way that suffuses the colony's future with optimism, though there is much pain before the end. It is worth noting that one of the story's more memorable characters is an alien, the xenobiologist Wic'owoyake, or Tam.

Eyes of Amber is a collection of Vinge's shorter work, including, of course, the Hugo-winning title story. I suppose "Eyes" deserved its prize, for it is another example of the excellent work that has appeared in Analog (June 1977), but to my mind the collection's closing story, "Tin Soldier," from *Orbit 14,* is a more moving and more original vision of a future—one of the few that has brought tears to my eyes. The immortal inn-keeper, a prosthesis-repaired ex-soldier, kept off the spaceways because he is male and partly artificial, tends a bar while his customers, the women of the starships, come and go, returning only after many years. He falls in love with a starwoman, their affair continues, interrupted by long separations, and finally he receives word of her death. But that is not the story's end. You'll have to read it to learn that, and then you will weep too.

For the past few years, Del Rey Books has been bringing out "The Best of..." books. They've treated Leiber, Pohl, Kuttner, Campbell, Dick, Bloch, and many more. The latest is **The Best of James Blish,** and an unexceptionable best it is. There are "Surface Tension," "Testament of Andros," "The Oath," "How Beautiful with Banners," and a sample of William Atheling, Jr.—"Probapossible Prolegomena to Ideareal History," not quite completed before Blish's death in 1975 and showing it. There is, however, a difficulty with the whole idea of "Best of..." collections. Who chooses, and how? In this case, the chooser was Robert Lowndes, and he chose to select stories which, while good, comprise more of a survey of Blish's lifework than an actual best. Some of the stories are therefore dated, for they go back to 1940, while Blish did better work in later years. This, I suppose, is the trouble when a publisher chooses to honor a dead man—the temptation to summarize his life, rather than to glorify its peak, is irresistable. Still, Blish was good enough and had a great enough influence on SF to deserve the honor.

I've mentioned the **Chrysalis** original anthology series here before. Number 5 is now out, and again it is an acceptable stand-in for a magazine. Stories by Card, Malzberg & Pronzini, Bischoff, Wilder, and Grant, fourteen in all, and the best of them is Cherry Wilder's "A Long, Bright Day by the Sea of Utner," in which a long-lived sea monster converses with generations of ephemeral men. Or is it Hilbert Schenck's "Wave Rider," in which a mad yachtsman and his computerized trimaran take the crest of a 200-foot deep ocean and ride it for a day at over 70 knots? Or does it matter? Torgeson seems able to get good material. *Chrysalis* is a book to watch.

Brian Aldiss has lately been playing anthologist. On this side of the Big Ditch readers are most familiar with his *Galactic Empires* (2 vols.), but that

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is only the latest in a series of more-or-less related theme anthologies that are now seeing print here. I have before me one called **Evil Earths,** a predecessor to *Galactic Empires* and a successor to *Space Opera* and *Space Odysseys,* which I—and presumably you—have yet to see. He has set himself the task of mining the old magazines, of bringing "up scraps of bone, broken pots, and jewels beyond price for those who have no access to the magazines," and in it he succeeds quite well. He captures the changing flavors of SF as it has evolved, focusing on one theme at a time, and his museum of potsherds is well worth visiting.

Evil Earths is a collection of black visions. It includes Howard Fast's "The Wound," in which an oil well strikes blood; William Tenn's "Down Among the Dead Men," in which old soldiers are literally retreads; Aldiss' own "Heresies of the Huge God," which reminds me of a certain other story in which Earth was liberated too many times; and John W. Campbell's "Night," a picture of the end of time and civilization's holdout against heat death. There is even the Kuttner novel *The Time Trap,* readable for nostalgia more than anything else.

Finally, I have two books as nonfiction of the month, saved for last so you'll know where to find them and where to stop if you could care less. First is Jerry Pournelle's **A Step Farther Out,** a collection of his *Galaxy* columns devoted largely to the proposition that humanity has a grand and glorious future before it if it will only get off its collective duff and take the first steps toward the ample energy and mineral resources to be found in the solar system. He tells us how to launch with lasers and A-bombs, build space colonies and solar power satellites, mine the moon and asteroids, terraform Venus, and more. He details (roughly) the calculations of space travel, describes black holes, tells how fusion will work, and still more, more, more. He's enthusiastic, knowledgeable, and a skilled popularizer of difficult concepts. And *A Step Farther Out* is invaluable as a source of ideas for SF stories (he's used many of them himself), as background for stories whose ideas you want to know more about, and as a convincer for anyone you know who doesn't believe in the value of space. Pournelle, like myself and others, sees space as a frontier, a new and necessary environment for humanity, and he sees it very much in the old imperialist spirit of Manifest Destiny. If more people would only listen to him (and the rest of us), we could mobilize the national/international will and put an end to worries about energy crises, resource shortages, pollution, crowding, and all the rest of the doomster fears. He has a message of great good sense and necessity, but NASA is withering on the vine and our government is obsessed with short-term, down-to-Earth, at-home problems and solutions. If you want to do something for your grandchildren, buy a copy of this book for your senators and representatives. Push, prod, badger, and bully them to get us out there, to start the process that holds the only possibility of giving the Indian and African peasants an American standard of living, the only possibility of worldwide prosperity, peace, and freedom. And though that

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may sound like a hype, it's not. It's truth. And though it may be easy enough for SF readers and writers to believe—we're all technocrats at heart, aren't we?—it is heresy, or worse, to too many of our fellows. But read Pournelle and tell me I'm wrong.

Isaac Asimov's **A Choice of Catastrophes** is a compendium of fates from the eventual end of the universe through the various accidents that might befall our sun and planet to the more immediate disasters of resource exhaustion, population, and climate change. He appraises the risks of each fate, suggests ways to avoid it, and tells us the greatest risk is that we will starve, pollute, and crowd ourselves into extinction. Then he says that all this can be avoided if we will only get off Earth into space. He agrees with Pournelle, though he takes a different approach to telling us so. *Catastrophes* is deftly organized into a top-down survey of science from the viewpoint of hazards, and as such it could serve, with the addition of illustrations, as a text for the ubiquitous junior high general science course. As such, it might be better than the texts now in use, which typically are so dry and boring that they turn kids off from science and contribute to the head-in-the-sand attitude that makes solving current problems so difficult. Since kids of this age are in love with disaster, Asimov's book would do a lot to turn them on.

I hope *Catastrophes* gets gifted many times, for it could do the coming generation a lot of good. So could Pournelle's book, for that matter, as well as a host of others that all too often seem like voices crying in a wilderness of willful ignorance. ■

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BRASS TACKS

Dear Stan,

William Sims Bainbridge's statistical analysis of the old ASF Analytical Laboratory is interesting, of course, but seems to me to suffer from certain basic flaws. I hope my criticism won't seem ungracious; after all, he does have some gratifying things to say about me. However, in the same scientific spirit as him, I question his methodology.

The most obvious problem is that the Lab itself was never satisfactory. For one thing, it's clear that a story of given quality would make a better showing in a mediocre issue than in one where it had to compete with several really good items; and, inevitably, issues do vary in their levels of excellence. Perhaps this factor would even out when a long period of time is considered, but perhaps not—especially for authors who never published much; and in any event, there doesn't seem to have been consideration of it.

More serious is the fact that, as Campbell himself often complained, the people who bothered to send their story rankings to him were always too few to be a statistically significant sample of the readership. Isn't this the basic reason why you have finally abolished the department?

I think this is also the reason for the rather strange rankings of authors that Dr. Bainbridge obtains. When such writers as Gordon Dickson, James Blish, Theodore Sturgeon, Fritz Leiber, and Algis Budrys rate well down on the scale, something has got to be wrong! No doubt Dr. Bainbridge would reply that he was measuring popularity, not intrinsic literary merit; and it's true that when he corrects for story length, the rankings begin to look a bit more reasonable. However, what they then do, with a few obvious exceptions, is cluster near the middle of the diagram. Since the inadequate statistics of the Lab make for a very large probable error, it seems to me that this result is essentially meaningless.

Since I happen to be one of the three authors whose individual popularity he attempts to measure over the years, I naturally checked his graph against my own records. It turns out that in the period around 1958, when the method shows my reputation taking a nose dive, I published very little in ASF (and a goodly part of that was as "Winston P. Sanders," which Dr. Bainbridge doesn't seem to know was a pen name of mine). Those few items included "Call Me Joe" and *The Man Who Counts,* two of my most widely reprinted stories. Though it may be unfair to introduce extraneous data, I

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can't help remarking that any number of editors were pressing me to contribute at this same time, and this was also when the committee of the 1959 World Convention asked me to be guest of honor.

Let me repeat that these remarks are made in a friendly spirit, without the least bit of pique. I think I see why my curve bends downward so sharply just then. Of those few tales in ASF, so few as to make the statistics doubly suspect, most were short. As Dr. Bainbridge himself observes, and Campbell did repeatedly, short stories practically never won out against novelettes and serials. This does not mean that a writer suddenly became unpopular whenever he published one of the former.

For a while I wondered whether or not there could be some way of allowing for longevity. After all, it's happened now and then that some newcomer produced something absolutely brilliant that beat out all competition in the issue where it appeared, and little or nothing thereafter. The method would then presumably show him to be more popular than some respected long-time producer such as Clifford Simak—which is absurd on the face of it. However, I decided that it wouldn't be worth the trouble of going through all the mathematics necessary to correct such a flaw, since the material we have to work with is hopelessly flawed itself.

In fact, I believe this is what Dr. Bainbridge's work has proven beyond doubt, that the entire concept of the Lab was unworkable. Though that may disappoint him, his effort has actually been valuable; negative results are as essential to science as positive. Low though my opinion of literary criticism as a genre is, I now discover that reader surveys are worth even less.

It seems that editors will just have to keep on using their traditional tools of individual judgment, intuition, and whatever feedback they can get in less formalized fashion. But you knew that all along, didn't you?

POUL ANDERSON

Yep. The numbers remain fun to play with, and I think even somewhat useful—but the useful conclusions I draw from them depend more on intuitive judgment and "extraneous data" than from rigorous analysis of the numbers themselves.

Dear Stan,

William Sims Bainbridge in his article "The Analytical Laboratory, 1938-1976" in the January 1980 Analog made a statement that I simply cannot pass without comment.

He said, "We cannot say for sure that Asimov was driven out of science fiction by a declining popularity, and only he can tell us if he experienced his career in this way."

Well, for goodness sake, *what* declining popularity? *How* was I driven out of the field?

I never left it. I appeared infrequently in Astounding/Analog after the early 1950's but that was, in part, due to a coolness between Campbell and myself that followed upon the appearance of "Dianetics" in the May 1950 issue and Campbell's subsequent interest in fringe-areas of science. The result was that my best stories: "The Last Question," "The Caves of Steel," "Lastborn," "The Feeling of Power" and so on appeared in other magazines and were never voted on in the Analytical Laboratory.

What's more, I continued writing

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science fiction through the 1960's and 1970's with considerable success. My novel "The Gods Themselves," published in 1972 after serialization in *Galaxy* and *If,* won both the Hugo and the Nebula. My novelette, "The Bicentennial Man" published in 1976 in an anthology of originals also won both the Hugo and the Nebula.

Third, I have maintained my contact with the science fiction world through means other than the writing of fiction. For over twenty years I have written a monthly science essay in *Fantasy and Science Fiction,* and for three years I have worked with *Isaac Asimov's Magazine of Science Fiction* and *Asimov's S.F. Adventure Magazine.*

All this should lessen Bainbridge's befuddlement in saying, "One of the most remarkable facts about Asimov's career is that he has established himself as possibly the most famous contemporary science fiction writer, despite the fact that most of his fiction was written decades ago and did not receive consistently favorable ratings." Given the *real* facts, that business about "most famous," if true, is not in the least remarkable.

But then, if not my "declining popularity" what drove me to spend most of my time in science writing? Well, I like science writing, I'm good at it, there's a need for it, and while science fiction pays 5¢ a word, my science writing pays $1 a word.

ISAAC ASIMOV

Dear Mr. Schmidt:

I have always accepted that critics are entitled to express their opinions of books—what would be the point if they didn't? But I find myself with two (legitimate?) objections to Tom Easton's review of my SF novel, *Renaissance.* One is a factual error. He attributes to me the statement that all my writings since (presumably) 1950 reflect dianetic theory about human behavior. This is the opposite of the truth. I have said that one of these days I shall write a dianetic SF novel, naming it as such. But meanwhile, since I am well read in orthodox psychology, and am the co-author of *The Hypnotism Handbook,* which is progressively—since its publication in 1956—gaining favor in university psychology departments, *all* human behavior references in my stories are either Freudian, Jungian, Adlerian or generally accepted sources.

My second objection to Easton's review has to do with his suggestion that "has-been writers" (like myself) be put out to pasture much as has-been race horses, so that young writers would have publication space made for them. In this area I have the purest record in SF. After Ben Bova became editor of Analog, he asked me several times to write for the magazine. I said no. I told him I was grateful to the old Astounding for giving me a showcase, and that I felt that I did not wish to deny space in a single issue to upcoming writers.

Perhaps there should be a pasture for those wrong-headed, benighted people who are still reading my

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maunderings. But I really think that the whole notion of control is the most outrageous idea I have ever seen in the column of a reviewer. Sorry, Mr. Easton, and sorry, new writers, but in all the arts at all levels of competence, and especially in the book and paperback markets, new writers are going to have to battle for position in the good old competitive American way. And be glad that with unimportant exceptions the profit motive alone guides the publishers.

One more thing: After reading the distorted review of *Renaissance* (obviously hastily read in the well-known critic tradition), I have decided that my years of altruism are not appreciated. And so I shall resume writing for the SF magazines. If any young writer suffers from this, let him send his story to Mr. Easton.

A.E. VAN VOGT

Dear Stanley,

I would kindly like to correct an assumption made in Tom Easton's review of Michael Bishop's *Transfigurations* in the January '80 issue. The book is an anthropological fiction, its two main characters in fact being cultural anthropologists, and it is wrong-thinking to expect that a work dealing with anthropology should have "certainty to the explanations of the mysteries" involved. Anthropologists, especially cultural ones, do not deal in certainties; it is a science of general analytical field observations and theoretical extrapolation in words, not figures. There are few to none solid, synthetical answers. There are as many "ifs" and "maybes" abounding in Leakey's *Origins* as in *Transfigurations.* Compared to the empirical bases of mathematics and physics that engineers and astronomers have, anthropologists are as guilty as Bishop's characters in having to "spin out elaborate hypotheses, guesses, fantasies which are allowed to stand for answers."

Without concrete answers, the book does not "sing" for Mr. Easton. On the contrary, it does sing for me; because it is true, with all its inherent ambiguities, to the science which it employs. A book of technological fiction, for instance, must be true to physical facts; but a book of anthropological, cultural, fiction must ultimately be true to anthropological methodology.

Rightly "nothing is definite" in the novel *Transfigurations,* as Mr. Easton claims it should be. Science fictions, today, are as varied as the sciences. Mr. Easton, a fine reviewer, has used criteria applicable for judging one variety to judge another. As a reader of Analog, I felt it necessary to respond on this matter. As a columnist in Analog, I feel Mr. Easton's views should be open to rebuttal. Is this not the desired "openness" between the writer and the audience?

Beyond this, and this is my opinion —open to rebuttal, I think the novel is of reasonable prizeworthy quality. It is not only a window on a future alien species that closely resembles man, but a mirror on the human condition of the present. Its uncertainties are in essence reflections of our uncertainties on our own being and origins. I do, however, agree with Mr. Easton that it is not a candidate for big sales; those uncertainties are by nature disturbing and that is not popular reading. Why this is so, I wish someone could explain.

ROBERT FRAZIER

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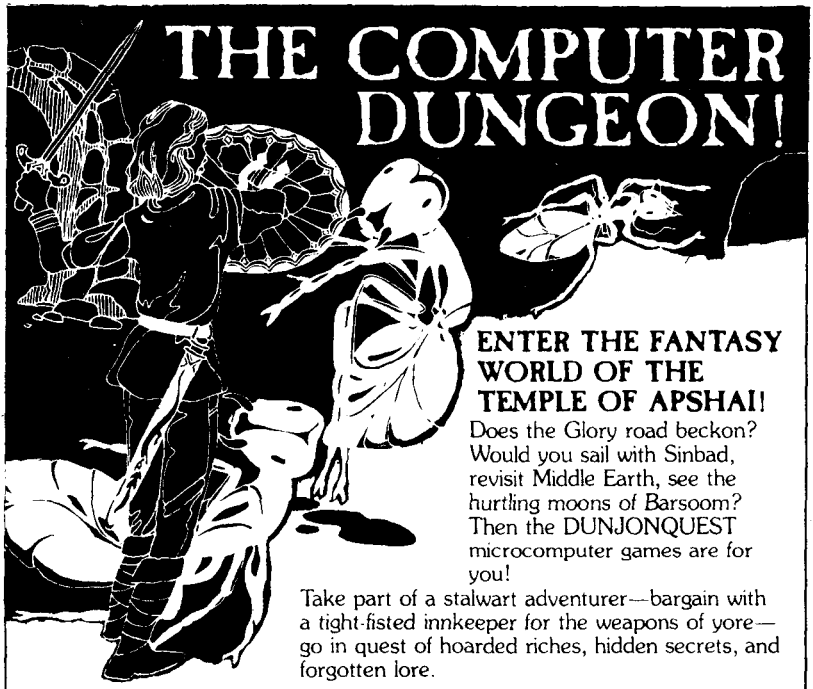

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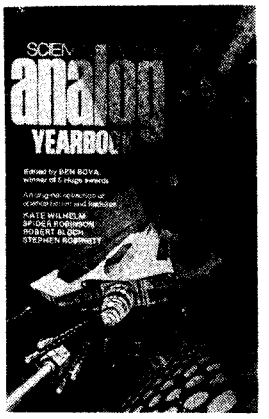

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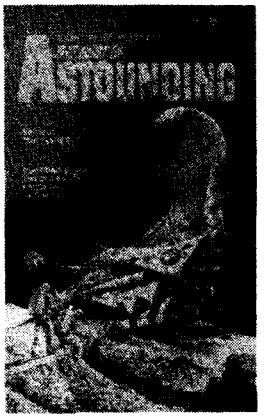

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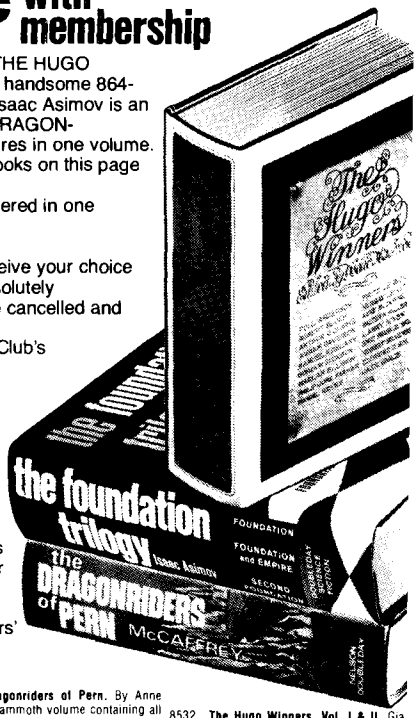

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